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Technical Bulletin No. 2

Recommended Varieties of Paddy for West Bengal

40898

FOREWORD.

For increasing food production it is well known that saturation of the entire paddy area of West Bengal with high yielding varieties of paddy is one of the essential prerequisities. In this Bulletin the Botany Section of the Directorate of Agriculture, West Bengal under the able guidance of Shri A. K. Paul, has presented a description and a clear picture of such varieties which, if multiplied to cover the entire paddy area of West Bengal, are expected to increase the food production in the State. This Bulletin has been written with a view to give to the administrators, the extension workers and research staff such help which they need in raising seeds of pure paddy varieties.

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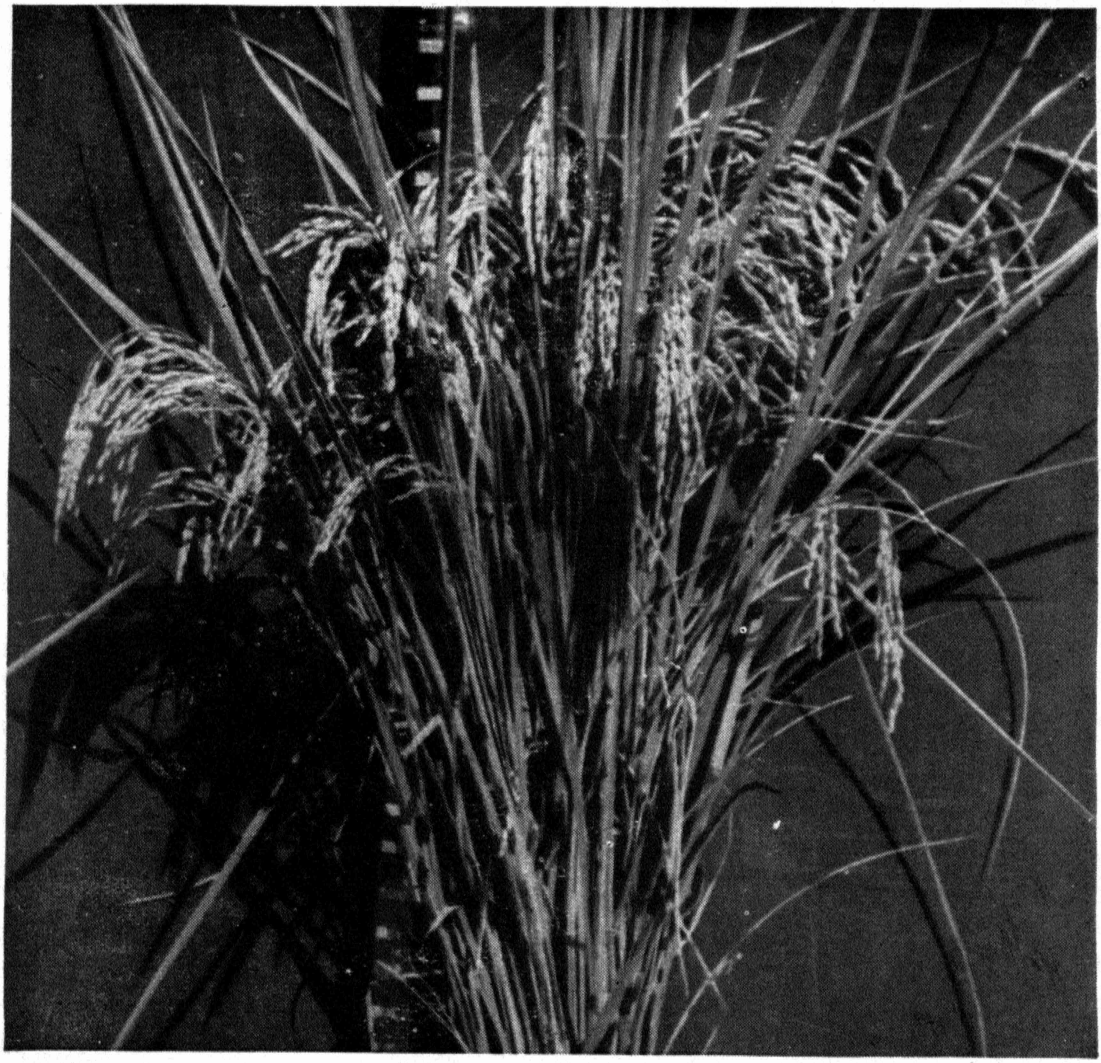

A PROMISING SELECTION FROM
A JAPONICA X INDICA CROSS

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INTRODUCTION

Paddy being the principal food crop of West Bengal it is vitally connected with the life and economy of the State. As such, great importance for its improvement has been paid since pre-partition days. Out of a total area of 14,310,400 acres of cultivable land, paddy alone occupies more than 11 million acres, of which Aus 1,571,000 acres, Aman 9,726000 acres, Boro-82,000 acres. But even then the total production which varies between 4 and 5 million tons of clean rice is not suffiicient for the entire population of the State, which at present stands at nearly 35 millions. This is, because, the cultivators of this State have not yet availed of the opportunity of using the modern scientific methods of agriculture *e.g.*, use of improved seeds, fertilisers and manures, irrigation and improved cultural practices. By using improved seeds along with fertilisers and irrigation water whenever available, it is expected that the per acre yield of paddy will be pushed up considerably. The present average per acre yield of clean rice is between 10.40 and 12.84 mds., whereas an average yield of improved strains (Aus, Aman, Boro) can easily be doubled.

Agroclimatically West Bengal can be divided into four distinct tracts or regions depending on the texture and composition of soil, rainfall, temperature, humidity, salinity etc.

REGION I :

Consisting of the districts of Bankura, Birbhum, West Midnapore, Asansol Subdivision of Burdwan and Purulia* where the rainfall generally varies between 45″—50.07″ with number of rainy days between 62 and 77.

REGION II :

Consisting of the districts of Burdwan (except Asansol), Malda, Hooghly, 24-Parganas (except coastal lines), Murshidabad, Howrah and East Midnapore, where the annual rainfall generally varies between 55″ and 75.08″ with 65—80 rainy days.

REGION III :

Consisting of the districts of West Dinajpur, Coastal areas of 24-Parganas and Central Midnapore with an annual average rainfall between 58.17″ and 69.41″ generally, with 75—87 rainy days.

REGION IV :

Consisting of the districts of Jalpaiguri, Coochbehar* and Darjeeling with annual average rainfall between 112.28″ and 156.22″ with 102—139 rainy days.

(The division of the regions have been quoted from "the Report on soil conservation, West Bengal"—J. K. Basu (1949) and the average rainfall figures from "A brief Agricultural Geography of West Bengal"—S. N. Mukherjee (1956).

Each of these regions is again divided into different situations according to the capacity to retain moisture in it. This is because, most of the paddy areas in this State is mainly rainfed and has no source of artificial irrigation. Of course, things may change with the availability of irrigation water. Thus, situation I or high land, where the capacity to retain moisture is very little and may be just sufficient to grow a crop of Aus paddy, but that even sometimes suffers, if rainfall is not adequate at critical stages, specially at boot-stage and post-flowering stage. Situation II or medium high land (lower than situation I), is suitable for growing late Aus and early Aman varieties. Situation III of Region I or medium land of Regions II and III, suitable for growing medium maturity varieties of Aman paddy. Situation IV of Region I or medium low land of Region II & III is suitable for growing certain medium to late maturing varieties of Aman Paddy. Lowland of Region I and low land of other regions is suitable for late and flood resistant varieties of Aman paddy, where generally the water accumulates to a depth of 3'-4', during the rainy season. Besides, there are low lying areas in almost all the regions, where the depth of water may reach to a considerable extent and may be found suitable for growing deep water paddy varieties. In these areas and as well as in low lying areas certain varieties of Aman paddy also may be grown advantageously under direct sown or broadcast condition, with the advent of first showers. The advantage is that with the rise of water level, the plant grows up and copes with the rise of water.

Thus, varieties of paddy for these different regions also vary widely. A variety suitable for a particular region may not be suitable for another region. Accordingly tests were carried out in different agroclimatic regions and situations and only those varieties which proved statistically superior to others in different regions have been recommended as improved strains for those regions and situations. So, while growing these varieties one has to take particular care to see, that it is grown in the particular region and situation for which it is recommended, otherwise, it may not achieve the desired results or even meet with failures in some cases. However, certain varieties which have wide adaptability, may prove suitable in more than one region *viz :* Marichbutti, Bhasamanik, Patnai—23, Raghusail etc.

In West Bengal, paddy as a whole can be divided into 3 main classes, Aus or Autumn paddy, Aman or Winter paddy, Boro or Spring paddy according to the season of its maturity. Thus Aus paddy also may be called as Summer paddy, when it is early ripening *i.e.* maturing in Summer when grown early, *viz.* Dular, Satika etc. Medium and late maturing Aus paddy are generally called Autumn paddy. Aus paddy generally takes a particular period to mature from the date of its sowing, therefore, it is called *periodically fixed,* or non-sensitive to Photo-

*These districts have been newly added to West Bengal.

period. Whereas, Aman or Winter paddy generally flowers at a particular time *i.e.* between end of September and middle of November according to particular short day when arrived at, so it is called *time fixed* or sensitive to photoperiod. Boro or spring paddy, on the other hand, though matures in spring but is generally sown and transplanted in winter. But when this is grown during the Kharif season, it behaves just like Aus paddy ; whereas Aus paddy when grown during Boro or winter season, it behaves like Boro paddy, *i.e.* takes a much longer period to mature.

METHODS OF CULTIVATION :

Aus paddy can be grown both under direct sown (broadacast or line sown) and transplanted conditions. When direct sown, seeds may be drilled in lines, 9"—12" apart and subsequently seedlings in the lines are thinned to 3"—4" apart. When transplanted, seedlings generally between the age of 21 and 25 days are transplanted in well puddled plots with 1—2 seedlings per hole, with a spacing of 6"×6" or 6"×9". The latter however, facilitates better intercultural operations. Seed beds are prepared according to convenience with the advent of first showers, generally in end May to early June and transplanted in end June to early July. *When transplanted, it takes slightly longer period to mature than when grown under direct sown condition.* Aman paddy on the other hand, is invariably grown under transplanted condition in West Bengal and the seed beds of which are generally prepared in the month of June and transplanted between 15th July and 15th August (earlier the better) in well puddled lands with 5—6 weeks old seedlings @ 2—3 per hole, with a spacing of 6"×12" facilitating better intercultural operations. In case of Boro paddy, it is generally grown under transplanted condition and seed beds are made in the month of November and transplanted in well puddled land, in the month of December with 5—6 weeks aged seedlings @ 2—3 seedlings per hole with a spacing of 6"×6" or 6"×9".

Intercultural operations should be given in all the cases, as and when necessary, preferably with paddy field weeders.

FERTILIZERS AND MANURES:

In order to increase the yield of paddy crop judicious application of manures and fertilizers should be done. The mode, kind and the amount of fertilizer to be added, are given in the Technical Bulletin No. I.

DISEASES AND PESTS :

The paddy crop as a whole, is likely to be affected by several diseases and pests specially under unfavourable conditions.

DISEASES :

The major diseases of paddy are Brown spot disease caused by *Helminthosporium oryzae* Breda de Haan and Blast disease caused by *Piricularia oryzae* Cav. There are, however, a number of minor diseases also, which have not been found to cause much damage *e.g.* Foot rot caused by *Fusarium moniliformae* Sheld., Stack burn caused by *Trichoconis padwickii* Ganguly and

Narrow brown leaf spot caused by *Cercospora oryzae* Miyake. Besides, there may be *sterm rot* caused by *Sclerotium oryzae* Cat. and Bunt caused by *Neovossia horrida* (Tak) Padwick & A. Khan.

There may, however, be various disease-like symptoms in some cases causing serious damage to paddy but the causes are not known as yet. Hence the trouble is called 'Physiological.' Patches of plants here and there, are noticed to turn yellow to brown suddenly and may ultimately die. The root system completely rot away, if timely precaution (*i.e.* complete draining out of the accummulated water, drying the field for few days, and application of fertilizer and water again) is not taken.

CONTROL MEASURES :

For control of primary seed borne infections due to Brown spot, Blast and Foot rot diseases, dry seeds should be treated in a seed dresser with organo-mercurial dry seed disinfectant compounds such as Agrosan GN etc., before sowing, at the rate of 1 part of Chemical to 300 parts of seed.

Secondary infections due to Brown spot, Blast and Narrow Brown Leaf Spot can be kept under control by spraying the crop in seed beds or in fields with 0.4% solution of copper fungicides such as Blitox or Fytolan.

PESTS :

The major pests are stemborer (*Schoenobius incertulas Wlk*), Rice Hispa (*Hispa armigera* 01.) and Gandhi Bug or Rice Bug (*Leptocorixa-cuaa* Thun.). Besides, there are several minor pests *e.g.* rice army worm (*Spodoptera mauritia* Boisd), Case-worm (*Nymphula depunctalis*, Gn.) rice grasshopper (*Hieroglyphus banian* F), Leaf-roller (*Cnaphalocrocis medinalis* Gn.) etc. Sometimes considerable damage is also caused by crabs, snails and rats.

CONTROL MEASURES :

In case of stemborer, wettable B.H.C., D.D.T. or Endrin may be sprayed on the *plant parts* from time to time. Besides, if arrangement for light traps are made, the attack of this pest may be reduced. In case of Hispa, and Rice Bugs, dusting with B.H.C. may prove efficacious. If the plants are young, coir rope wetted with 'Kerosene oil emulsion' may be drawn over the plants, to destroy the pest (Hispa). Most of the other insect pests can however, be controlled effectively by BHC dusting. In case of snails and crabs, copper sulphate cystals may be applied here and there in the fields. Rats may be killed by fumigating the rat holes by cyanogas powder.

CONCLUSION :

While preparing this bulletin, though every possible care has been taken to check all the characters again and again, but still there may be some lacunae which might have escaped our notice, as this had to be prepared in a very short time. About 8—10 years' records of character notes have been consulted and an average of all such characters has been given here. Variations wherever noticed, specially in the pigmentation and other characters

viz. in panicle length, number of spikelets per panicle, number of tillers per plant etc. have been covered as far as possible. Besides, awns and height of plants are also variable characters, the growth of which depend entirely on enviornmental conditions. Similarly, pigmentation wherever present, may be deeper in some cases, when the plant surface is more exposed to sunlight and less when it is shaded. In the above cases, therefore, a range has been given. Even dates of flowering also may, sometimes, slightly differ from those given here depending on the temperature and day length, which may vary from year to year and place to place. In case of both Aus and Aman paddy, however, if the sowing or planting is done between October and January, the flowering may take either a much shorter or longer period than what has been mentioned here. This is because, of the intervening cold temperature and short day length during this period. Otherwise, sowing or planting from the month of February to September behaves more or less in the above manner. Boro paddy is generally grown in the pockets, wherever, the source of water is available. But this can also be grown in all the regions except hilly region with too cold temperature and saline areas, with the availability of adequate supply of irrigation water.

Besides, varieties of paddy having wide adaptability, when grown in different regions may differ in their flowering and maturity periods. In case of plant-height the measurement has been shown from the base of the plant to the base of the flag leaf.

The units of measurements adapted in this bulletin are in Metric system, but in the photographs these have been shown in feet and inches, which is due to non-availability of measuring tape in Metric system, at the time of taking the photographs.

Whenever any introduced variety of paddy has been recommended for this State after proper testing, the original name has been retained along with our recommendation number.

In order to facilitate complete understanding of the Botanical terms used in connection with the description of paddy varieties, an illustration of a paddy plant, showing the different parts in details, (Plate I) along with detailed description has been given here. Regarding chapters on fertilisers, diseases and pests the experts concerned were consulted. The important identification characters in respect of each variety has been given in italics.

It is hoped, therefore, that this would meet the long-felt need of the rice workers.

Explanation of the abbreviations used in this bulletin is given below :—

ABBREVIATIONS

L.S.	...	Leaf Sheath.
Gl.	...	Glume.
L & P	...	Lemma & Palea.
Ap.	...	Apiculus
Infl. length		Inflorescence Length.
Grains/Panicle	...	Grains per panicle.
c.m.	...	Centimetre (0.3937 inches)
m.m.	...	Millimetre (0.03937 inches)

PADDY PLANT (Oryza sativa, L.)

The rice plant has a hollow erect, jointed stem, the height of which varies, depending on the variety and the enviromental conditions under which it is grown. The root system is usually of the spreading type, never growing too deep into the soil, its extent being controlled by the condition of the soil and the water supply. During the vegetative phase of the plant the main root system is composed of long thin much-branched roots, light brown in colour, together with a few thick unbranched "white roots". These, later change into the ordinary type of brown roots as the plant develops. The aerial parts of the plant comprise the main stem and its tillers, basal erect branches from the lower nodes of the main stem. The tillers vary in number with variety and conditions, and are somewhat shorter than the main stem. The internodes of the stem are fairly uniform in width, and become increasingly longer higher up the stem. The nodes are well-marked, being thicker than the internodes and usually having a coloured pulvinus at the base of the internode above.

The leaf consists of a long sheathing leaf base, split along its whole length, and with epidermal cells which are often pigmented, the pigment being either localized at the base of the sheath or evenly distributed over the whole epidermis. The ligule is membranous and prominent, often splitting at maturity, and is attended by two small curved auricles. The leaf blade has a well-defined midrib, and is a long narrow structure, often slightly hairy and in many varieties coloured. The first formed leaf is the coleoptile, and the second leaf which emerges through the coleoptile has practically no blade and the uppermost leaf, or 'flag" of the plant, which protects the developing panicle has a much broader, and shorter blade than the normal leaves.

The inflorescence is a terminal panicle, carried on the uppermost internode and protected during its development, and in some varieties even after maturity, by the "flag". The main rachis of the panicle is angular and bears numerous primary branches at the nodes, these in turn carry secondary branches on which the spikelets are borne. The size and compactness of the panicle varies with the variety. In the clustered types there are spikelets between two and seven carried together, but in many varieties the spikelets occur singly. The pedicel has a flattened base on which the spikelet is borne and the apex of the pedicel may be extended into two small flaps on either side ; these structures have been interpreted as the remains of two sterile glumes. The spikelet itself therefore consists of two small narrow shining pointed glumes enfolding the single flower which is made up of a large, often coloured, boat-shaped lemma, *five-nerved*, hairy and pointed or often awned, a firm palea, *three-nerved* and also projected into a point at the apex, and the six stamens surrounding the ovary in two whorls. Flowering of the panicle proceeds from the apex downwards and occupies a week or more. The flowers open rapidly and pollen is shed before the flower opens or

at the time of opening ; self-fertilization is the rule, although a small variable amount of cross-pollination may take place. The mature grain is closely enclosed by the dry lemma and palea which form the husk, and the pericarp of the caryopsis is often pigmented. Milling of rice, to produce the white polished grains of commerce, removes the lemma and palea, the embryo and the pericarp. Much of the nutritious part of the grain is removed in this process. The vitamin content can be partially transferred to the endosperm from the outer layers by parboiling and undermilling. This process, if fully adopted, would greatly increase the feeding value of commercial rice, though it would involve the retention of much of the bran layer of the seed.

Sterility of a part or all of the inflorescence is common in rice, and if not caused by physiological upset or the attack of stem parasites may be due to defective pollen, the production of which seems to be inherited character in some varieties. Mutations leading to defective anthers are also known.

EXPLANATION OF THE TERMS USED

ROOT—The descending portion of the plant, fixing it in the soil and absorbing moisture and nutrients.

STEM—The main axis of the plant which remains above the soil and bears leaves and flowers.

TILLERS—Suckers from the base of the stem or side shoots, which also behave like the original stem.

SHEATH—(Leaf sheath)—The broad base of the leaf enclosing the stem of the paddy plant. It also helps in protecting the stem.

JUNCTURA—The jointed portion of the leaf base and the leaf blade.

AURICLE—Narrow hair like leafy growth at the junction of the leaf base and the blade, here two in number, often pigmented. It is also called lateral appendage of the leaf.

LIGULE—A membranous tongue like appendage or short leafy outgrowth on the inner surface of the leaf at the joint of leaf base and the leaf blade.

NODE—The knob or jointed swelled portion on the stem from which leaves arise.

INTERNODE—The elongated portion of stem in between two nodes or joints.

PULVINUS—The swollen portion at the junction of the axis (stem) and leaf stalk or sheath.

LEAF-BLADE OR LAMINA—The upper portion of the leaf up to the junctura. A leaf of a paddy plant is mainly divided into two portions, upper, called the leaf blade and the lower, called the leaf sheath, which generally encloses the stem. The lower portion of the leaf blade joins the upper portion of the leaf sheath at the junctura.

FLAG LEAF—The top most leaf on the stem which protects the developing panicle and has a much broader and shorter blade than the normal leaves.

EXSERTION—The base of the panicle or panicle stalk without grains between the junctura of the flag leaf and the lower most spike of the panicle.

PANICLE—A compound Racemose type of inflorescence consisting of several spikes,

SPIKELET—A single floret of a Raceme or of a spike which ultimately forms the seed.

INFLORESCENCE—A bunch of flowers arranged on an axis.

GLUME—Minute bract at the base of the spikelet or small leafy outgrowth at the base of the spikelet which remains attached to the Lemma and Palea.

LEMMA—The boat shaped outer half of the husk having *five ribs* enclosing the reproductive organs.

PALEA—The firm smaller inner half of the husk having *three ribs* enclosing the reproductive organs. Both Palea and Lemma enclose the reproductive organs.

HAIRS—Small fibre like epidermal outgrowth which may be spiny sometimes on different parts of the plant and on Lemma and Palea.

APICULUS—Short tip of the Lemma.

OVARY—The enlarged portion of the female organ which matures into fruit.

STIGMA—The upper portion of the ovary, feathery in appearance. There are two stigmas in a floret of paddy.

FLORET—A very small flower is called a floret.

ANTHER—The upper portion of the male organ or stamen which produces pollen grains. There are six stamens in a paddy floret.

AWN—The thorn like elongated portion of the tip of Lemma. It is popularly called "beard".

GRAIN—The seed of a cereal is generally called a grain (A paddy seed is really a fruit)

COLEOPTILE—The first formed leaf of the embryo in a monocotyledonous plant

RICE—The inner portion of a paddy grain obtained by removing the husk.

ABDOMEN—The heart of the rice grain, which may be sometimes whiter when it is called abdomen-white, and translucent i.e. neither opaque nor transparent. The heart of a rice grain when not white is called translucent.

PERICARP—The covering of the fruit.

CLASS : AUS—(A) SUMMER PADDY

1. CHINSURAH. 12 (SATIKA)

A strain introduced from Orissa and recommended in 1953 for general cultivation. Suitable for high lands in alluvial tracts, though both under direct sown and transplanted condition, but generally used as direct sown paddy. Sown in the end of May with the advent of first showers, transplanted in June and harvested in August—taking a total period of 75–80 days when directly sown and 95–100 days when transplanted. Flowers between 55 and 60 days when directly sown and 45–50 days after transplantation, gives an average yield of 15–16 mds. with yield potential of 24 mds. per acre, under Chinsurah condition.

Highly susceptible to Helminthosporium, Blast and Stemborer.

Coleoptile—Green; L.S.—Green; Gl.—Light green, L & P—Mottled Green; Ap.—Green; Mature grain—Deep brown in furrows with light ridges, Hairy, empty glumes—White, awnless; Habit—Spreading, Highly lodging, Grains shattering; average number of fertile Tillers 13–14, average Height of

plant—93–94 cm., straw thin hollow and weak; average length of Inflorescence 17–18 cm., *partly exserted* (Plate 2, figure–2), number of grains per panicle 74; medium size—(8.06 × 2.71 × 1.97 mm.) (Plate–5, figure 1) weight of 1000 grains 19.0 gms.; Outturn of rice from paddy 68·4% by weight. *Rice medium, dull brownish red with white abdomen* (Coloured Plate I, figure 4).

Favoured for its early maturity and double and triple cropping purposes, as well as for flood affected areas when it is harvested before the advent of flood. It can also be grown successfully as Boro paddy.

Recommended for Nadia, Murshidabad, Howrah, Hooghly and Burdwan districts.

N.B.—Seed of Satika when mature has no dormancy, and if harvesting is delayed, germinate in earheads with little moisture.

2. CHINSURAH–4 (DULAR)

A hybrid between Dumai (Early Aus) and Larkoch (Late Aus) from East Pakistan and released in the State in 1948. Suitable for high lands in both lateritic and alluvial soils, though both under direct sown and transplanted conditions but generally used as transplanted paddy in the lateritic soils and direct sown in Nadia and Murshidabad Districts. Sown in May with the advent of first showers, transplanted in June and harvested in August—September, taking a total period of 85–90 days when direct sown and 105–110 days when transplanted. Flowers in 55–60 days when directly sown and 45–50 days after transplantation, giving an average yield of 17–18 mds. per acre with yield potential of 28 mds. per acre.

Moderately resistant to Helminthosporium and stem borer.

Coleoptile—Purple, L.S. Purple, Gl.—Light green, L & P—Golden, Ap.—Purple, Mature grain—Brownish to brick red in colour, Empty glumes—White, awnless; Habit—*compact, erect; Nonshattering*, Tillers 7–8, Height—111–112 cm, Inflorescence 22–24 cm., partly exserted (Plate–2, figure 1), grains per panicle 126–127, medium size (8.6 × 2.8 × 2.07 mm.) (Plate–5, figure I), weight of 1000 grains 20.0 gms. Outturn of rice from paddy 75% by weight. *Rice medium, amber coloured with slight white abdomen* (Coloured Plate I, figure 5). Fairly responsive to fertilizers and manures.

Favoured for its early maturity, amber coloured rice, double and tripple cropping purposes and as well as for flood affected areas, when harvested before advent of flood, with wide adaptability and slight drought resistance.

Recommended for Hooghly, Burdwan Bankura, Birbhum, Midnapore, Purulia, Nadia and Murshidabad districts.

AUS—(B) AUTUMN PADDY

3. CHINSURAH–8 (MARICHBUTTI)

A selection isolated from allied strains of local paddy and recommended for general cultivation in 1948. Suitable for high to medium high lands in both alluvial and lateriatic tracts, under transplanted as well as direct sown conditions. Sown in May-June transplanted in end June and harvested by end of August-

September taking a total period of 90–95 days when directly sown and 110-115 days when transplanted. Flowers in 60–70 days when directly sown and 50–55 days after transplantation. Gives an average yield of 25–26 mds. with yield potential of 31 mds. per acre under Chinsurah condition.

Moderately resistant to Helminthosporium and stem borer.

Coleoptile—Green, L.S.—Purple to purple tinge, Gl.—Light purple, L & P—Green, Ap.—Purple even at Maturity, mature grain—Blackish brown to grey, awnless; Habit—compact, Erect ; *Non-shattering;* Tillers 8–10, Height 96–99 cm.; Inflorescence length 22–23 cm. *exserted* (Plate 2, figure 3); grains per panicle–104, *coarse* (7.85×3.29×2.09 mm.) (Plate 5, figure 2), weight of 1000 grains 25.0 gms.. Outturn of rice from paddy 80% by weight *Rice coarse, dull brownish red, with slight white abdomen* (Coloured Plate I, figure 6).

Fairly responsive to fertilizers.

Favoured for its wide adaptability and high yield among medium Aus varieties, for double cropping purposes and also slight drought resistance.

Recommended for all the Districts of West Bengal except Darjeeling, Jalpaiguri, Coochbehar and saline areas.

4. CHINSURAH-6 (DHAIRAL)

A selection from East Pakistan materials and released for general cultivation in 1948. Suitable for high to medium high alluvial soils both as transplanted and direct sown paddy. Sown in May–June, transplanted in end June and harvested in end August–September taking a total period of 90–95 days when direct sown and 110–115 days when transplanted. Flowers in 65–70 days when sown directly and 55–60 days after transplantation. Performs better under rich soil condition, giving an average yield of 18–20 mds. with yield potential of 25–26 mds. per acre under Chinsurah condition.

Highly susceptible to Helminthosporium, Blast and Stem borer.

Coleoptile—Green, L.S.—Purple tinge, Gl.—Purple, L & P—Green, Ap.—Deep purple when green, Mature grain—Straw coloured, awnless ; Habit compact, Erect, partially Shattering, Tillers 7—8, Height 102—104 cm.; straw weak and lodging; Inflorescence length 22–23 cm. *exserted* (Plate 2, figure 4), grains per panicle 114, coarse (8.03×3.40×2.18 mm.) (Plate 5, figure 2) weight of 1000 grains 27 gms. Outturn of rice from paddy 66.6% by weight. *Rice coarse, reddish, with white abdomen* (Coloured Plate I, figure 8).

Moderately responsive to fertilizers and manures, but lodges.

Favoured as medium maturity direct sown paddy. It is also used for preparation of medium quality parched rice ("Muri").

Recommended for Nadia, Murshidabad, Howrah, Hooghly and Burdwan districts.

5. CHINSURAH-10 (CHARNOCK)

A selection from East Pakistan materials and recommended for general cultivation in 1948. Suitable for high to high medium lands in alluvial tract both under direct sown and transplanted conditions. Sown in May–June, transplanted

in end June–July, and harvested in September taking about 100–105 days when direct sown and 110–115 days when transplanted. Flowers in 65–70 days when direct sown and 55–60 days after transplantation. Average yield 18–20 mds. with yield potential of 25–26 mds. per acre under Chinsurah condition.

Moderately resistant to Helminthosporium and Stem borer under normal condition in the plains, but susceptible in the high altitute.

Coleoptile—Green, L.S.—Green, Gl.—Light green, L & P—Green, Ap.—Green, Mature grain—Golden straw to yellow coloured, awnless; Habit-erect, Non-shattering; Tillers 9–10, Height 128–130 cm.; fine and fairly strong straw; Inflorescence length 27–28 cm. exserted (Plate 3, figure 1), grains per panicle 165, *fine, long* (8.78 × 2.39 × 1.95 mm.) (Plate 5, figure 1), weight of 1000 grains 18 gms. *Outturn of rice from paddy* 88.9% by weight. *Rice fine, white, transluscent* (Coloured Plate1, figure 7).

Fairly responsive to fertilizers and manures.

Favoured for its fine white rice (finest among aus varieties) and wide adaptability. It has been found to give a good ratoon crop.

Recommended for the alluvial districts of West Bengal except high altitude of Darjeeling district and saline areas.

6. BANKURA-4 (BHUTMURI-36)

A selection from local Bhutmuri aus group of lateritic tract and released for general cultivation in 1948. Suitable for high to medium high lands in both alluvial and lateritic soils (sit. I & II) under transplanted condition. Sown in June transplanted in July, harvested in end September taking about 100–105 days in lateritic tract and in alluvial tract 110–115 days. Flowers in 50–55 days in lateritic tract and slightly later in alluvial tracts. Average yield 18–20 mds. with yield potential of 29–30 mds. per acre in alluvial soil and slightly less under lateritic condition.

Moderately susceptible to Helminthosporium and stem borer.

Coleoptile—Purple, L.S.—Purple, Gl.—Purple, L & P—Brown to blackish, Ap.—Purple, Mature grain Blackish grey to blackish brown in the same earhead, awnless; Habit—Spreading, partially Shattering; Tillers 12–14, height 121–122 cm.; Inflorescence length 22–24 cm.; *well exserted* (Plate 3, figure 4), grains per panicle 103, medium size (7.59 × 2.77 × 2.07 mm.) (Plate 5, figure 2), weight of 1000 grains 20.0 gms. Outturn of rice from paddy 75% by weight. *Rice medium, red with slight white abdomen* (Coloured Plate I, figure 9).

Fairly responsive to fertilizers.

Favoured as medium Aus with wide adaptability. It is also suitable as Boro paddy.

Recommended for lateritic tracts.

7. BANKURA-2 (JHANJI-34)

A selection from allied varieties of local paddy in lateritic zone and recommended for general cultivation in 1948. Suitable for high to medium high lands in lateritic soils under transplanted condition only. Sown in June, transplanted

in July and harvested in September–October taking about 105–110 days in lateritic but slightly later in alluvial tracts. Flowers between 55 and 60 days after transplantation but slightly later in alluvial soils. Average yield 18–20 mds. with yield potential of 25–26 mds. per acre, under Bankura condition.

Moderately susceptible to Helminthosporium.

Coleoptile—Green, L.S.—Green, Gl.—Green, L & P—Green, Ap.—Green, Mature grain *Yellowish brown, awnless.* Habit spreading, partially Shattering, fertile Tillers 8–9, Height 100–102 cm., Inflorescence length 21–22 cm. *well exserted* (Plate 3, figure 2), grains per panicle 102, coarse (8.15 × 3.09 × 2.11 mm.) (Plate 5, figure 2) weight of 1000 grains 22.0 gms. Outturn of rice from paddy 63.7% by weight. Rice *coarse, red, with white abdomen* (Coloured Plate I, figure 10.)

Favoured for wide adaptability and slight resistance to drought. It can also be grown successfully as Boro paddy.

Recommended for the lateritic tract.

8. BANKURA-6 (ASHKATA)

A selection from allied local varieties of lateritic zone and released for general cultivation in 1948. Suitable for medium to medium high soils of both lateritic and alluvial tracts under trnasplanted condition only. Sown in June, transplanted in July and harvested in October taking about 115–120 days in lateritic tract and about a week more in alluvial tract. Flowers between 60 and 65 days from transplantation, but slightly later in alluvial tract gives an average yield of 18—20 mds. with yield potential of 32–33 mds. per acre under Bankura condition.

Moderately susceptible to Helminthosporium and stem borer.

Coleoptile—Purple, L.S.—Purple, Gl.—Green, L & P—Green, *Ap.—Purple, Mature grain-Yellowish straw coloured, awned* (different grades); Habit—Spreading, lodging, *Non-shattering,* fertile Tillers 9–10, Height 140–142 cm., Inflorescence length 26–27 cm.; exserted (Plate 3, figure 3); grains per panicle 130, coarse (8.35 × 2.67 × 1.99 mm.) (Plate 5, fig. 1) weight of 1000 grains 19.00 gms. Outturn af rice from paddy 73.7% by weight. Rice coarse, white with Yellowish tinge, with slight white abdomen (Coloured Plate 1, fig. 11).

Favoured for its wide adaptability.

Recommended practically for the entire State except Darjeeling, Jalpaiguri and Coochbehar districts and saline areas.

9. CHINSURAH-2 (KELE)

A selection from Kele Aus group of Hooghly district and released in 1948. Suitable for high to medium high soils in alluvial tract under transplanted condition. Sown in June, transplanted in end June–July and harvested in September taking 110–115 days. Flowers between 60 and 65 days after transplantation. Average yield 15–16 mds. with yield potential of 24–25 mds. per acre, under Chinsurah condition.

Moderately susceptible to Helminthosporium.

Coleoptile—Purple, L.S.—Light purple, Gl.—Green, L & P—Brown to blackish, Ap.—Purple, Mature grain—Dull brownish grey to dull blackish grey, generally awnless, but certain

grains occasionally awned in the same panicle. Habit—Spreading, partly shattering, fertile tillers 12–14, Height 123–124 cm.; Inflorescence length 22–23 cm., exserted (Plate 4, figure I), grains per panicle 100, medium coarse (8.00×2.89×2.06) weight of 1000 grains 24.00 gms. Outturn of rice from paddy 63.7% by weight. *Rice medium coarse, red with slight white abdomen* (Coloured Plate I, figure 12).

Favoured for good hulling quality.

Recommended for Howrah, Hooghly and Burdwan districts. It is specially popular in Hooghly district for which selection was undertaken.

10. CHINSURAH-14 (O.C.52)

A selection from local Aus materials and recommended in 1960. Suitable for high alluvial soils both under direct sown and transplanted condition but better as a transplanted crop. Sown in May-June, transplanted in June and harvested in September taking a total period of about 90–95 days when direct sown and 108–112 days when transplanted, i.e., slightly later than Dular. Flowers in 55–60 days after transplantation. Average yield 25–26 mds. with yield potential of 36–37 mds. per acre, undr Chinsurah condition.

Moderately susceptible to Helminthosporium.

Coleoptile—Purple, L.S.—Purple, Gl.—Green, L & P—Blackish, Ap.—Purple, mature grain—Dirty black to brownish black in the same ear had, awnless; Habit—Intermediate, partially shattering, fertile Tillers 15–16, height 112–114 cm.; Inflorescence length 21–22 cm., *slightly exserted* (Plate 4, figure 2), grains per panicle 64, medium coarse (8.43×2.94×2.03 mm.) (Plate 5, figure 3), weight of 1000 grains 27.0 gms. Outturn of rice from paddy 81.5% by weight. *Rice medium coarse, amber to redish tinged, with slight white abdomen* (Coloured Plate I, figure 3).

Fairly responsive to manures and fertilizers.

Favoured for its early maturity, double cropping purposes and appreciably high yield.

Recommended for Nadia, Murshidabad, Howrah, Hooghly and Burdwan districts for the present.

11. CHINSURAH-16 (N.C. 1626)

A strain selected from the local Aus materials of Burdwan district and recommended in 1960. Suitable for medium high alluvial soils though both under transplanted and direct sown conditions but generally grown under transplanted condition. Sown in May-June, transplanted in end June-July and harvested in September, taking 90–95 days when direct sown and 108–112 days when transplanted. Flowers in 55–60 days from transplantation, giving an average yield of 24–25 mds. with yield potential of 34–35 mds. per acre, under Chinsurah conditions.

Moderately resistant to Helminthosporium.

Coleoptile—Green, *L.S.—Purple tinge, Gl.—Purple*, L & P—Green, *Ap.—Purple, Matured grain Straw yellow with small violet tip, awnless*; Habit—Spreading with lodging tendency, *non-shattering*, fertile Tillers 13–14, Height 146–148 cm., straw slightly weak; Inflorescence length 25–26 cm., *well exserted* (Plate 4, figure 3), grains per

panicle–94, medium sized (7.69×2.56× 1.81 mm.) (Plate 5, figure 3), weight of 1000 grains 21.00 gms. Outturn of rice from paddy 76.2% by weight. Rice medium white, transluscent (Coloured Plate I, figure I.)

Fairly responsive to manures and fertilizers.

Favoured for early maturity, white transluscent rice and fairly high yield.

Recommended for Nadia, Murshidabad, Howrah, Hooghly and specially Burdwan districts for the present.

12. CHINSURAH–18 (N.C. 918)

A strain obtained by selection from local materials of Bankura and relased in 1960 for general cultivation. Suitable for medium alluvial soils though both under transplanted and direct sown conditions but generally as a transplanted crop. Sown in May–June transplanted in June–July and harvested in October taking a total period of 130–135 days when transplanted. Flowers 70–75 days after transplantation, giving an average yield of 26–27 mds. with yield potential of 37–38 mds. per acre, under Chinsurah condition.

Moderately resistant to Helminthosporium.

Coleoptile—Green, L.S.—Green, Gl.—Green, L & P—Green, A.P—Green, *Matured grain Golden yellow or yellow with brown furrows*, awnless, empty glume—*straw coloured*, Habit—Intermediate, non-shattering, fertile Tillers 9–10, Height, 152–154 cm., *Inflorescence length* 30-32 *cm.*, slightly exserted (Plate 4, figure 4), *Grains per panicle* 142–144, medium coarse (9.47×3.01×2.13 mm.) (Plate 5, figure 3), weight of 1000 grains 26.00 gms. Outturn of rice from paddy 77% by weight. Rice medium coarse, white with slight white abdomen (Coloured Plate No. 1, figure 2).

Fairly responsive to fertilizers and manures.

Favoured for white rice with higher yield amongst late Aus varieties.

Recommended for Nadia, Murshidabad, Howrah, Hooghly and Burdwan districts for the present.

CLASS: AMAN OR WINTER PADDY EARLY GROUP

13. BANKURA–1 (BADKALAMKATI–65)

A selection from the Kalamkati group of Bad land or situation II paddies in the lateritic zone and released in 1948. Suitable for medium high land of alluvial soils as well as situation II of lateritic tracts under transplanted condition. Sown in June, transplanted in mid July flowers between end September to 1st week of October, matures in 1st week of November taking about 110–115 days from planting. Flowering 72–75 days from transplanting. Average yield 25–26 mds. with yield potential of 29–30 mds. per acer under Bankura condition.

Moderately resistant to Helminthosporium.

L.S.—Green, Gl.—Green, L & P—Green, Ap.—Green *Mature grain—Straw to yellow straw, empty glumes white, with pronounced oblique bent at top*, awnless; Habit erect, partially lodging, non-shattering, fertile Tillers 6–7 Height 130–132 cm. *well exserted* (12–13 cm.) grains per panicle

122–124 (Plate 7, fig I) medium (9.14 × 2.40 × 1.96 mm.), (Plate 20, fig. 1), 1000 grain weight 21.0 gms. Outturn of rice from paddy 70% by weight. Rice medium fine, white, transluscent (Coloured Plate II, fig 4). Moderately responsive to fertilizers and manures.

Favoured for its wide adaptability, early maturity and medium fine transluscent rice. Can also be grown successfully as Boro Paddy.

Recommended for almost all the districts of West Bengal specially Bankura, Burdwan and Birbhum, upto an altitude of 1500 ft.

14. BANKURA 37 (CHURNAKATI)

A selection from local paddy varieties of situation II of lateritic zone and released in 1953. Suitable for medium high land of alluvial and situation II of lateritic soils under transplanted condition. Sown in June transplanted in mid July, flowers between end September and 1st week of October, matures in early November taking a total period of 115–120 days from planting. Flowering 75–78 days from transplanting giving an average yield of 27–28 mds. per acre with yield potential of 36–38 mds. per acre, under Bankura condition.

Moderately resistant to Helminthosposium.

L.S.—Green, Gl.—Green, L & P—Green, Ap.—Green, *mature grains Yellowish straw to light brown* (Coloured Plate II, fig. 5), awnless. *Habit—spreading*, non-shattering; Tillers (fertile) 1 4–15, height 127–129 cm.; Inflorescence length 25–27 cm. *well exserted*, grains per panicle 154–156 (Plate 8, figure 1), *medium fine* (9.83 × 2.12 × 1.79 mm.) (Plate 20, fig. I), 1000 grains weight 19.0 gms. Outturn of rice from paddy 71% by weight. Rice medium fine, white (with very slight reddish tinge), transluscent. Responsive to fertilizers,

Favoured for high yield amongst early amon varieties, wide adaptability and quality rice.

Recommended for almost all the districts of West Bengal up to an altitude of 1500 ft.

15. BANKURA-5 (BADKALAMKATI-7)

A strain selected from the Kalamkati group of Bad land paddies of the lateritic tracts and recommended in 1948. Suitable for medium high or situation II of lateritic tracts under transplanted condition. Sown in June, transplanted in July, flowers between end September and 1st week of October matures in 1st week of November taking a total period of 110–115 days from planting. Flowering 72–75 days from transplanting giving an average yield of 22–23 mds. per acre with yield potential of 25–26 mds. per acre, under Bankura condition.

Moderately susceptible to Helminthosporium.

L.S.—Green, Gl.—Green, L & P—Green, Ap.—Green, *Mature grain Yellowish straw*, awnless; Habit—erect partially lodging, non-shattering, fertile Tillers 8–9, height 121–122 cm., *thin straw*, Infl. length 26–27 cm. *Well exserted*, grain/panicle 108–110 (Plate 7, fig. 3), medium fine (9.22 × 2.35 × 1.82 mm.)

(Plate 20, figure 1) *finer than Badkalamkati* 65, 1000 grain weight 18.0 gms. Outturn of rice from paddy 75% by weight. Rice medium fine, white, with slightly white abdomen. (Coloured plate II, figure 6).

Favoured for medium fine soft rice.

Recommended for the lateritic tract.

16. BANKURA (K×I—36)

A hybrid obtained by selection from a cross between Kataktara (Aus) × Indrasail (Aman) and released in 1948. Suitable for medium high or situation II of lateritic tracts under transplanted condition. Sown in June, transplanted in mid July, *flowers in end September to 1st week of October*, harvested in 1st week of November taking a total period of 114—118 days from planting. *Flowering 75—80 days from transplanting* giving an average yield of 25—26 mds. with yield potential of 30—31 mds. per acre, under Bankura condition.

Moderately resistant to Helminthosporium.

L.S.—Green, Gl.—Green, L & P—Green, Ap.—Green, *Mature grain yellowish straw to reddish brown*, awnless, (Coloured Plate-II, fig. 7). Habit—erect,partially lodging; grains non-shattering, fertile Tillers—5—6, Height 89—90 cm. *Straw—thick*, Infl. length 22—23 cm. Well exserted, grains panicle 103—105 (Plate 7, fig. 2), medium (9.65 × 2.96 × 1.94 mm.), (Plate—20, fig. I), 1000 grain weight 21.5 gms. Outturn of rice from paddy 74% by weight. Rice medium, *with slight* reddish tinge, *with slight white abdomen* (Plate II, fig. 7).

Favoured for its early maturity and puffed rice ("Khai").

Recommended for lateritic tract.

MEDIUM GROUP

17. BANKURA—13 (BADKALAMKATI—141)

A selection from local Kalamkati paddy varieties of lateritic zone and released in 1948 for general cultivation. Suitable for medium or situation II of lateritic soils under transplanted conditions. Sown in June transplanted in July *Fl owering in 3rd week of October* taking a total period of 122—128 days from planting. *Flowering 92—98 days from transplanting* giving an average yield of 25—26 mds. per acre with a yield potential of 34—35 mds. per acre under Bankura condition.

Moderately resistant to Helminthosporium.

L.S.—Green, Gl.—Green, L & P—Green, Ap.—Green, Mature grain—*golden to yellowish straw*, awnless (Coloured Plate II, fig. 8). *Habit—compact*, non-lodging, non-shattering ; fertile tillers 7—8, height 125—127 cm. *Infl. length 23—25 cm.* exserted, grains panicle 127—129,(Plate—7, fig. 4) medium (8.98 × 2.65×1.93 mm.), 1000 grain weight 21.0 gms. Outturn of rice from paddy 76% by weight. Rice medium, white (sometimes *with slight reddish tinge*) *with slight white abdomen.*

Favoured for wide adaptability and good quality of rice and for puffed rice ("Khai").

Recommended for lateritic tracts.

18. BANKURA—25 (NONARAMASAIL)

A selection from local paddy varieties and recommended in 1948. Suitable for medium or situation III of lateritic soils under transplanted condition. Sown in June transplanted in July, flowers in 3rd week of October, matures in 3rd week of November taking a total period of 125—130 days from planting. Flowering 95—100 days from planting giving an average yield of 24—25 mds. per acre with a yield potential of 33—34 mds. per acre, under Bankura condition.

Moderately resistant to Helminthosporium.

L.S.—Green, Gl.—Green, *L & P—reddish orange*, Ap.—Green, *Mature grain-Reddish brown*, awnless, (coloured Plate—II, fig. 9.) *Habit-Compact*, non-shattering. non-lodging; fertile Tillers 9—10, Height 116—118 cm. Infl. length 28—29 cm. well exserted (Plate 8, fig. 2) grains per panicle 182—184, *fine* (8.34 × 2.22 × 1.78 mm.) (Plate—20, fig. 3), 1000 grain weight 15.0 gms.; outturn of rice from paddy 77% by weight. Rice fine white, transluscent (Coloured Plate II, fig. 9).

Favoured for comparatively shorter duration and fine rice, suitable for "Polao".

Recommended for lateritic tract.

19. CHINSURAH—13 (RUPSAIL)

A selection from local paddy varieties of Howrah and 24-Parganas, released in 1948 for general cultivation. Suitable for medium alluvial and Situation III of lateritic soils under transplanted condition. Sown in June, transplanted in July, flowers in 3rd week of October, matures in 3rd week of November taking a total period of 127—132 days from planting. Flowering 98—103 days from transplanting giving an average yield of 24—25 mds. per acre with a yield potential of 31—32 mds. per acre, under Chinsurah condition.

Moderately resistant to Helminthosporium.

L.S.—Green, Gl.—Green, L & P—Green, Ap.—Green, *Mature grain—Straw coloured*, generally awnless (coloured Plate II, fig. 10) *but sometimes top spikelets are slightly awned ortipped; Habit spreading*, non-lodging, Tillers (fertile)—10—12, Height—141—143 cm.; Infl. length 26—27 cm. *exserted* grains/panicle 162—164, (Plate 8, fig. 3) medium fine (8.78 × 2.19 × 1.84 mm.) Plate—20 fig. 4), 1000 grain weight 17 gms. Outturn of rice from paddy 78.3% by weight. Rice medium fine, white, transluscent.

Favoured for wide adaptability including medium saline areas and good quality rice.

Recommended for 24-Parganas, Howrah, Hooghly, Midnapore and Bankura.

20. CHINSURAH—29 (INDRASAIL)

Originally a selection from a collection of Northern Bengal done at Dacca, in East Pakistan and recommended in 1948 for general cultivation in West Bengal, after a through test. Suitable for medium alluvial soils including North Bengal and Situation III of lateritic tracts under transplanted condition. Sown in June,

transplanted in July, flowering between 3rd and 4th week of October, matures in end November to 1st week of December, taking a total period of 132—136 days from planting. Flowering 95—100 days from planting, giving an average yield of 25—26 mds. per acre, with a yield potential of 38—39 mds. per acre under Chinsurah condition.

Moderately resistant to Helminthosporium.

L.S.—Green, Gl.—Green, L & P—Green, Ap.—Green, *Mature grain Straw coloured, tipped* to *slightly awned* (Coloured Plate II, fig. 11), *Habit spreading*, non-shattering, Tillers (fertile) 9—10, height 141—143 cm. Infl. length 25—27 cm. grain/panicle 122—124 (Plate 8, fig. 4) *long bold* (9.7×2.6×2.0 mm.) (Plate 20, fig. 2), 1000 grain weight 24.0 gms. Outturn of rice from paddy 75% by wight, fairly responsive to fertilizers. Rice medium, coarse white, transluscent.

Favoured for good quality rice and for parched rice (Muri).

Recommended for Bankura and North Bengal Plains.

21. BANKURA—9 (MALTU)

A selection from allied varieties of local paddy and released in 1953 for general cultivation. Suitable for medium land *i.e.*, Situation III of lateritic tract under transplanted condition. Sown in June, transplanted in July, flowering 3rd week of October, matures in 3rd week of November taking a total period of 122—128 days from planding. Flowering 92—98 days after planting, giving an average yield of 24—25 mds. per acre with a yield potential of 28—30 mds. per acre, under Bankura condition.

Moderately susceptible to Helminthosporium.

L.S.—Purple, Gl.—Green, L & P—with purple tinge, Ap.—Slightly Violet, Mature grain—Straw coloured, awnless (Coloured Plate II, II, fig. 12). Habit spreading, non-shattering, non-lodging, Tillers (fertile) 8—9, height 99—101 cm.; Infl. length 23—25 cm. *well exserted*, grains per panicle 136—138, (Plate 9, fig. I), medium coarse (7.98×2.90×1.93 mm.) (Plate 20, fig. 3), 1000 grain weight 20 gms. Outturn of rice from paddy 73% by weight, moderately responsive to fertilizers ; Rice, *medium coarse, red with white abddmen.*

Recommended for lateritic tract.

22. BANKURA 15 (BOLDER)

A selection from local varieties of paddy of lateritic tract and recommended in 1948. Suitable for medium low land *i.e.* slightly lower than Situations III of lateritic soils under transplanted condition. Sown in June, transplanted in July ; flowering in 4th week of October, matures in 1st week of December taking a total period of 130—135 days from planting. Flowering 100—105 days from planting, giving an average yield 26—27 mds. per acre with a yield potential of 32—33 mds. per acre, under Bankura condition.

Moderately susceptible to Helminthosporium.

L.S.—Purple, Gl.—Green, L & P—Green, Ap.—Green, *Mature grain Golden to deep brown coloured, awned* (Coloured Plate II, fig. 13). Habit spreading, non-shattering, lodging, Tillers (fertile) 7—8, Height

126—128 cm.; Infl. length 25—27 cm. *well exserted*, grain/panicle 142—144, (Plate 9, fig. 2), Bold (8.74×3.04×2.0 mm.) (Plate 20 fig. 1), 1000 grain weight 25 gms. Outturn of rice from paddy 76% by weight. Rice coarse, white with white abdomen.

Favoured for wide adpatability and for puffed rice. (Khoi)

Recommended for lateritic tract.

23. BANKURA—19 (KALADUBRAJ)

A selection from local paddy varieties of lateritic tract and released in 1948. Suitable for medium low lands *i.e.* lower than Situations III of lateritic soils under transplanted condition. Sown in June, transplanted in July, flowering end October, matures in December taking a total period of 135—140 days from planting. Flowering 103—108 days from transplanting, giving an average yield of 24—25 mds. per acre with a yield potential of 30—32 mds. per acre, under Bankura condition.

Moderately susceptible to Helminthosporium.

L.S.—Purple, Gl.—Green, L & P—Green, Ap.—Blackish, Mature grain—Yellow to yellow straw coloured, awanless to slightly awned (Coloured Plate II, fig. 14) ; Habit spreading, non-shattering lodging, Tillers (fertile) 6—7, Height 130—132 cm.; Infl. length 19—21 cm. *well exserted*, grains/panicle 95—97, (Plate 9 fig. 3), medium (8.53×2.51×2.09 mm.), (Plate 21, fig. 2), 1000 grains weight 22 gms. Outturn of rice from paddy 79% by wieght. Rice medium, white transluscent.

Recommended for lateritic tract.

24. BANKURA—11 (HARKUM)

A selection from local varieties of lateritic tracts and recommended in 1948. Suitable for medium low lands *i.e.* lower than Situations III of lateritic soils under transplanted conditions. Sown in June, transplanted in July, flowering in mid to 3rd week of October, matures in mid to 3rd week of November taking a total period of 120—125 days from planting. Flowering 90—95 days from transplanting, giving an average yield of 25—26 mds. per acre with a yield potential of 32—33 mds. per acre under Bankura condition.

Moderately susceptible to Helminthosporium.

L.S.—Purple, Gl.—Green, L & P—with purple tinge, Ap.—Purplish, Mature grain—straw coloured, awnless (Coloured Plate II, fig. 15). Habit spreading, non-shattering, non-lodging, Tillers (fertile) 8—10, Height 85—87*cm.* Infl. length 21—23 cm. *well exserted*, grains/panicle 118—120, (Plate 10, fig. 1), medium (8.08 × 2.69×1.90 mm.) (Plate 20, fig. 1), 1000 grains weight 18.8 gms. Outturn of rice from paddy 73% by weight. Rice medium, white (with reddish tinge) opaque.

Recommended for lateritic tract.

25. BANKURA - 21 (AJAN—246)

A selection from local paddy varieties of lateritic zone and released in 1948. Suitable for medium to low lands *i.e.* Situations III & IV of lateritic tracts under transplanted condition. Sown in June, transplanted in July, flowering in 4th week of October, matures in last week of

November to first week of December, taking a total period of 130—135 days from planting. Flowering about 100 days from planting, giving an average yield of 27—28 mds. per acre, with a yield potential of 37—38 mds. per acre, under Bankura condition.

Moderately resistant to Helminthosporium.

L.S.—Purple, Gl.—Green, L & P—Green, Ap.—Green, Mature grain—Reddish brown colour, awned (Coloured Plate II, fig. 16) habit spreading, non-shattering, non-lodging; Tillers (fertile) 9—10; Height 115—117 cm.; Infl. length 22—24 cm. *well exserted,* grains/panicle 89—91, (Plate 10, fig. 2) *long* (9.9×2.74×1.99 mm.) (Plate 20, fig. 3), 1000 grain weight 23 gms. Outturn of rice from paddy 77% by weight. Rice long, white, transluscent.

Favoured for wide adaptability and for pressed rice ("Chira")

Recommended mainly for lateritic tracts and as well as alluvial soil of Burdwan district.

26. BANKURA-17 (DAHIJIRA)

A selection from local paddy varieties of lateritic tract and recommended in 1948 for general cultivation. Suitable for medium to low lands i.e. Situations III and IV of lateritic tract under transplanted condition. Sown in June, transplanted in July, flowering in 4th week of October, matures in last week of November to 1st week of December taking a total period of 130–135 days from planting. Flowering about 100 days from transplanting, giving an average yield of 25–26 mds. per acre, with a yield potential of 34–35 mds. or more per acre, under Bankura condition.

Moderately resistant to Helminthosporium.

L.S.—Purple; Gl.—Green; L & P—with purple tinge; Ap.—Purple; Mature grain Yellowish straw coloured, tipped (Coloured Plate II, figure 17); Habit compact, non-shattering, non-lodging; Tillers (fertile) 6–7; Height 118–120 cm. Infl. length 21–23 cm. *inserted;* grains/panicle 132–134 (Plate 9 figure 4), Bold (8.11×3.10×2.07 mm.) (Plate 21, fig. 2), 1000 grains weight 20.6 gms. Outturn of rice from paddy 78% by weight. Fairly responsive to fertilizers. Rice coarse, *dull red with white abdomen.*

Favoured for its good soft rice when boiled and also for puffed rice. (Khai)

Recommended for lateritic tract.

27. CHINSURAH-27 (JHINGASAIL)

A selection from local materials collected from Howrah, Hooghly, Burdwan, Bankura, Midnapore and released for general cultivation in 1948. Suitable for medium alluvial and Situations III & IV of lateritic soils under transplanted condition. Sown in June, transplanted in July, flowering in 4th week of October, matures end November to 1st week of December taking a total period of 130–135 days. Flowering about 100 days from transplanting, giving an average yield of 24–25 mds. per acre, with a yield potential of 29–30 mds. per acre, under Chinsurah condition.

Moderately susceptible to Helminthosporium.

L.S.—Green, Gl.—Green, *L & P—*

Golden, Mature grain—Golden, awned (Coloured Plate II, figure 18), Habit spreading, nonshattering, highly lodging; Tillers (fertile) 8–10, Height 118–120 cm.; Infl. length 23–24 cm. *exserted*, grains/panicle 143–145 (Plate 10, fig. 3), long coarse (10.33 × 2.55 × 1.97 mm.) (Plate 20, figure 2), 1000 grain weight 25.0 gms. Outturn of rice from paddy 80% by weight. Rice long, bold, white with slight white abdomen.

Favoured for wide adaptability slight resistance to drought and for good quality pressed, parched and puffed rice ("Chira", "Muri" and "Khai").

Recommended specially for Howrah, Hooghly, Burdwan and Bankura.

28. BANKURA-29 (SINDURMUKHI)

A selection from local paddy varieties of lateritic tract and released in 1948. Suitable for medium to low lands i.e. Situations III and IV of lateritic tract under transplanted condition. Sown in June, transplanted in July, flowering 4th week of October matures in 1st week of December taking a total period of 130–135 days from planting. Flowering 100–105 days from planting, giving an average yield of 27–28 mds. per acre, with a yield potential of 47–48 mds. per acre or more under favourable condition, at Bankura.

Moderately resistant to Helminthosporium.

L.S.—Purple, Gl.—Green, L & P—with Purple tinge, Ap.—Purple; Mature grain—Reddish brown, awnless (Coloured Plate II, figure 19); Habit spreading, non-shattering, lodging; Tillers (fertile) 6–7, height 121–123 cm., Infl. length 22–24 cm., *well exserted*, grains/panicle 144–146 (Plate 10, figure 4) grains bold (9.12 × 2.96 × 2.91 mm.) (Plate 20, fig. 3), 1000 grain weight 22.5 gms. Outturn of rice from paddy 89% by weight. Fairly responsive to fertilizers. Rice coarse, white (sometimes with slight reddish tinge) with slight white abdomen.

Favoured for high yield and for puffed rice. (Khoi)

Recommended for lateritic tract.

29. CHINSURAH-35 (NIGERSAIL)

A selection obtained by introduction and released for distribution in 1953. Suitable for medium alluvial soils including North Bengal under transplanted condition. Sown in June, transplanted in July, flowering in 4th week of October, matures in 2nd week of December taking a total period of about 135–140 days from planting. Flowering 102–105 days from transplanting giving an average yield of 25–26 mds. per acre, with a yield potential of 34–35 mds. per acre under Chinsurah condition.

Moderately resistant to Helminthosporium.

L.S.—Green, Gl.—Green, L & P—Green, Ap.—Green, *Mature grain—Yellowish straw coloured*, awnless (Coloured Plate II, figure 20), Habit—spreading, non-shattering; *raises its head up when lodged and keeps the earhead up;* Tillers (fertile) 10–11; height 139–141 cm., Infl. length 27–29 cm., slightly exserted and *fully open*, grains/panicle 168–170 (Plate 11, figure 1) medium fine (7.8 × 2.4 × 1.8 mm.) (Plate 20, fig. 4), 1000 grain weight 19.0 gms. Outturn of rice from paddy 63.2% by

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weight, responsive to fertilisers. Rice medium, white transluscent.

Favoured for wide adaptability and good quality white rice.

Recommended for Howrah, Hooghly and Malda districts.

30. CHINSURAH-5 (NAGRA 41/14)

A selection from local Nagra group of paddy varieties of Hooghly and Burdwan districts and released in 1948 for general cultivation. Suitable for medium alluvial soils under transplanted condition. Sown in June, transplanted in July, flowering in 4th week of October, matures in end November to 1st week of December taking a total period of 125–130 days from planting. Flowering 95–100 days from planting, giving an average yield of 27–28 mds. per acre with a yield potential of 36–37 mds. per acre, under Chinsurah condition.

Moderately resistant to Helminthosporium.

L.S.—Green, Gl.—Green, L & P—Green, Ap.—Green, *Mature grain—Yellowish to golden straw coloured*, awnless (Coloured Plate III, figure 1). Habit—partially non-spreading, shattering, Tillers (fertile) 8–9, height 127–129 cm. Infl. length 26–28 cm. *exserted*, grains/panicle 132–134 (Plate 11, figure 2), medium (8.54×2.45 ×1.87 mm.) (Plate 20, figure 4), 1000 grain weight 20.0 gms. Outturn of rice from paddy 74.5% by weight, fairly responsive to fertilizers. Rice medium, *silky white, transluscent.*

Favoured for good quality medium rice.

Recommended for Hooghly (where it is very popular) and Burdwan district.

N.B.—Allied to Bhasamanik.

31. CHINSURAH-3 (BHASAMANIK)

A selection from local nagra group of paddy varieties of Hooghly district and a sister progeny of Nagra 41/14 and recommended for general cultivation in 1948. Suitable for medium alluvial and Situation IV of lateritic soils under transplanted condition. Sown in June, transplanted in July, flowers in last week of October, matures in end November to 1st week of December taking a total period of 125–130 days from planting. Flowering 95–100 days from planting, giving an average yield of 29–30 mds. acre with a yield potential of 39–40 mds. per acre or more, under favourable conditions at Chinsurah.

Moderately resistant to Helminthosporium.

L.S.—Green, Gl.—Green, L & P—Green, Ap.—Green, *Mature grain—Yellowish to golden straw* (Coloured Plate III, figure 2), awnless to slightly tipped; Habit slightly loose, non-shattering; *Tillers (fertile)* 13–14, height 123–125 cm. *generally shorter than Nagra.* Infl. length 21–23 cm. *slightly exserted, Flag leaf generally erect and remains higher than the earhead*, grains/panicle 125–126 (Plate 11, figure 3), medium (8.72× 2.22×1.77 mm.) (Plate 20, figure 2), 1000 grain weight 19.4 gms. Outturn of rice from paddy 67.6% by weight, fairly responsive to fertilizers. Rice medium white (slightly duller than Nagra 41/14) transluscent.

Favoured for wide adaptability, good quality medium rice with high yield and for good quality parched rice.

Recommended for Hooghly and Burdwan districts.

32. CHINSURAH 23 (DUDHSAR)

A selection from collection of united Northern Bengal and released in 1948 for general cultivation. Suitable for medium alluvial soils, including North Bengal under transplanted condition. Sown in June, transplanted in July, flowering in 3rd week of October, matures in end. November taking a total period of 122–128 days from planting. Flowering 92–95 days from transplanting giving an average yield of 27–28 mds. per acre with a yield potential of 36–37 mds. per acre, under Chinsurah condition.

Moderately resistant to Helminthosporium.

L.S.—Green, Gl.—Green, L & P—Green, Ap.—Green, *Mature grain—Yellowish straw coloured, tipped to awned* (specially top grains). Habit—partially spreading, non-shattering; Tillers (fertile) 8–10, height 145–147 cm.; infl. length 25–27 cm.; exserted, grains/panicle 119–120 (Plate 11, fig 4), medium (9.85 × 2.70 × 2.20 mm.) (Plate 20, figure 2), 1000 grains weight 21.0 gms.; Otturn of rice from paddy 76.2% by weight, fairly responsive to fertilizers. Rice medium coarse, *slightly creamy white with slight white* abdomen (Coloured Plate III, figure 3). Allied to Indrasail but maturing earlier.

Favoured for partially non-lodging habit, partial draught resistance, wide adaptability and also for puffed rice. (Khai)

Recommended for Northern Bengal districts.

33. CHINSURAH 25 (LATISAIL)

A selection from local varieties of Paddy of East Pakistan and released for cultivation in 1948. Suitable for medium alluvial soils under transplanted condition. Sown in June, transplanted in July, flowering in 3rd week of October, matures in end November taking a total period of 122–128 days from planting. Flowering 92–95 days from planting giving an average yield of 27–28 mds. per acre with a yield potential of 35–36 mds. per acre, under Chinsurah condition.

Moderately susceptible to Helminthosporium.

L.S.—Green, Gl.—Green, L & P—Green Ap.—green, *mature grain golden straw coloured, awnlesss* (Coloured Plate III, figure 4). Habit spreading, non-shattering, Tillers (fertile) 11–12, *height* 116–118 cm.; Infl. length 24–26 cm.; exserted, grains/panicle 102–104 (Plate 12, figure 1), medium coarse (8.56 × 2.90 × 2.08 mm.) (Plate 20, figure 2), 1000 grain weight 26.0 gms. Outturn of rice from paddy 69.3% by weight, fairly responsive to fertilizers. Rice medium coarse, white, with slight white abdomen.

Favoured for partially non-lodging habit and semi drought resistance. Can also be grown successfully as Boro crop.

Recommended for alluvial tracts.

N.B.—This variety shows a very uniform growth, maturing slightly earlier than Bhasamanik. *Highly non-shattering*, as such not easily threshable.

34. CHINSURAH 11 (KALMA-222)

A selection from local Kalma group of paddy varieties and released in 1948 for general cultivation. Suitable for medium alluvial soils under transplanted condition.

Sown in June, transplanted in July, flowering in end 3rd week to 4th week of October, matures in end November to 1st week of December taking a total period of 125–130 days from planting. Flowering 95–100 days from planting giving an average yield of 27–28 mds./acre with a yield potential of 35–36mds. per acre under Chinsurah condition.

Susceptible to Helminthosporium.

L.S.—Green, Gl.—Green, L & P—Green, *Ap.—Purple, Mature grain—Dull straw coloured, awnless to tipped* (Coloured Plate III, figure 5). Habit compact, erect, non-shattering, tillers (fertile) 6–7, height 121–123 cm.; Infl. length 25–27 cm. exserted, grains/panicle 96–98 (Plate 12, figure 2), *long bold* (10.34×2.62×2.11 mm.) (Plate 21, figure 2), 1000 grain weight 28.0 gms. Outturn of rice from paddy 76.9% by weight, well responsive to fertilizers. Rice long, bold, white transluscent.

Favoured for its quality as trade rice and for parched rice. (Muri)

Recommended for alluvial soils of Burdwan, Howrah & Hooghly.

35. CHINSURAH-37 (KALAMKATI-147)

A selection from local Kalamkati group of paddy and recommended for general cultivation in 1953. Suitable for medium alluvial soils under transplanted condition. Sown in June, transplanted in July, flowering in end 3rd week to 4th week of October, matures in end November to 1st week of December taking a total period of 128–132 days from planting. Flowering 95–100 days from planting, giving an average yield of 27–28 mds. per acre, with a yield potential of 40–42 mds. per acre under Chinsurah condition.

Moderately resistant to Helminthosporium.

L.S.—Deep purple, Gl.—Green, L & P—Green, Ap.—Green, Mature grain—Light brown, awned (Coloured Plate III, fig. 6). Habit, partially sprading, non-shattering tillers (fertile) 10–11, height 122–124 cm., Infl. length 26–27 cm., exserted, grains/panicle 109–111 (Plate 12, fig. 3) medium long (9.25×2.08×1.65 mm.) (Plate 20, fig. 4), 1000 grain weight 22.00 gms. Outturn of rice from paddy 61.2% by weight. Highly responsive to fertilizers. Rice medium, long white, transluscent.

Favoured for high adaptability to fertilizers, partial non-lodging habit and good quality rice with high yield.

Recommended for Hooghly and Burdwan districts.

N.B.—Allied to Bhasamanik but with *awns and grains slightly longer.*

36 CHINSURAH-15 (SEETASAIL-499)

A selection from local Seetasail group of paddy varieties of Howrah and 24-Parganas districts and released for cultivation in 1948. Suitable for Saline and medium alluvial soils under transplanted condition. Sown in June, transplanted in July, flowering in 4th week of October, matures in 1st week of December taking a total period of 130–135 days from planting, Flowering 98–103 days from planting, giving an average of 25–26 mds. per acre

with a yield potential of 33-34 mds. per acre under Chinsurah condition.

Moderately susceptible to Helminthosporium.

L.S.—Green, Gl.—Green, *L & P*—Golden, Ap.—Green, *Mature grain—Reddish brown with slight sharp tip* (Coloured Plate III, fig. 7). Habits preading non-shattering tillers (fertile)–12–13, height 138–140 cm., Infl. length 29–30 cm. well exserted, grains/panicle 159–161 (Plate 12, fig. 4), fine (8.67×2.04×1.75 mm.) (Plate 20, fig. 4), 1000 grains weight 15.3 gms. Outturn of rice from paddy 77.5% by weight. Rice fine, white, transluscent. Good quality straw, strong and thin, often used for thatching roofs.

Favoured for wide adaptability and fine rice.

Recommended for Howrah, Hooghly and 24–Parganas (saline and non-saline).

37. CHINSURAH–7 (PATNAI–23)

A selection from local Patnai varieties of Sundarban region and recommended for general cultivation in 1948. Suitable for medium and medium low alluvial and saline soils and also in low lateritic soils (Sit. IV) under transplanted condition. Sown in June, transplanted in July, flowering in 4th week of October, matures in end of November to December taking a total period of 125–130 days from planting, flowering 95–100 days from planting, giving an average yield of 30–32 mds. per acre with a yield potential of 44–45 mds. per acre, under Gosaba (24-Parganas) condition.

Moderately susceptible to Helminthosporium at Gosaba but resistant at Bankura and Chinsurah.

L.S.—Green, Gl.—Green, L & P—Green, Ap.—Green, *Mature grain—Straw coloured awnless* (Coloured Plate III, figure 8); *Habit compact, erect*, non-shattering, Tillers (fertile) 7–8, height 138–140 cm., Infl. length 25–27 cm., exserted; grains/panicle 116–118 (Plate 13, fig. 1), *long bold* (11.13×2.74×2.11 mm.), *allied to S.R. 26B and Kalma* 222 *but longer* (Plate 20, fig. 2), 1000 grain wt. 32.0 gms. Outturn of rice from paddy 71.5% by weight, fairly responsive to fertilizers, adaptable to slightly flooded, drought and saline conditions. Rice long, bold, white transluscent.

Favoured for wide adaptability. Commerically preferred as table rice and for good qualty puffed rice (Khai").

Recommended for both alluvial and lateritic tracts specially for 24-Parganas.

N.B.—Identical with Pat. 298 and S.R. 26B excepting that its embryo attached to the Kernel is not so pronounced and unlike S.R. 26B it has white rice.

38. CHINSURAH–9 (PATNAI–298)

Identical with Pat. 23 of which it is a sister selection, excepting that it is highly susceptible to Helminthosporium and has a pronounced large embryo atached to the Kernel.

39. BANKURA–23 (KALIKALMA)

A selection from local materials of lateritic tract and recommended in 1948. Suitable for medium to low lands i.e. Situations III and IV of lateritic tracts

under transplanted condition. Sown in June, transplanted in July, flowering in end 3rd week to 4th week of October, matures in end November to 1st week of December taking a total period of 130–135 days from planting. Flowering about 100 days from planting giving an average yield of 23–24 mds. per acre with a yield potential of 30–32 mds. per acre, under Bankura condition.

Moderately susceptible to Helminthosporium.

L.S.—Purple, Gl.—Green, L & P—With purple tinge, Ap.—Blackish purple, Mature grain—Yellow to yellowish straw colour, awned (Coloured Plate III, fig 19); Habit—partially spreading, non-shattering, partially non-lodging; Tillers (fertile) 9–10, height 122–124 cm., Infl. length 23–25 cm., *well exserted*, grains/panicle 102–104 (Plate 13, fig. 3) medium (9.97 × 2.69 × 1.96 mm.) (Plate 20, fig. 3), 1000 grain weight 20.3 gms. Outturn of rice from paddy 79% by weight. *Rice bold, red, with white abdomen.*

Recommended for lateritic tract.

40. BANKURA-27 (MANIKKALMA)

A selection from local materials of lateritic tract and recommended in 1948. Suitable for medium to low lands i.e. Situations III & IV of lateritic soils under transplanted condition. Sown in June, transplanted in July, flowers in end 3rd week to 4th week of October, matures in end November to 1st week of December taking a total period of 130–135 days from planting. Flowering 100 days from planting, giving an average yield of 23–24 mds. per acre, with a yield potential of 33–34 mds. per acre, under Bankura condition.

Moderately susceptible to Helminthosporium and stem borer.

L.S.—Gurple, Gl.—Green, L & P—Green, Ap.—Purplish, Mature grain—Dull straw coloured, awnless to slightly tipped (Coloured Plate III, fig. 11). Habit—partiallys preading, non-shattering, partially non-lodging, Tillers (fertile) 6–7; height 118–120 cm., Infl. length 21–23 cm., *well exserted*; grain/panicle 108–110 (Plate 13, fig. 4), coarse, 8.35 × 3.10 × 2.19 mm.) (Plate 20, fig. 3), 1000 grain weight 25.0 gms. Outturn of rice from paddy 75% by weight. *Rice coarse, light cream coloured, with pronounced white abodomen.*

Favoured for puffed and presced rice ("Khoi" and "Chira")

Recommended for lateritic tract.

41. BANKURA-31 (RAGHUSAIL)

A selection from local varieties of lateritic tract and recommended in 1948. Suitable for low lands i.e. Suitation IV of lateritic tract under transplanted condition. Sown in June, transplanted in July, flowering in 4th week of October, matures in 2nd week of December taking a total period of 140–145 days from transplanting. Flowering 100–105 days from planting, giving an average yield of 27–28 mds. per acre with a yield potential of 40–42 mds. per acre, under Bankura condition.

Moderately resistant to Helminthosporium.

L.S.—Purple, Gl.—Purple tinge, L & P—Reddish brown, Ap.—Purple, Mature grain Reddish brown with slight tipped to awned

(Coloured Plate III, fig. 12). Habit—erect, non-shattering, non-lodging, Tillers (fertile) 10–12, height 118–120 cm., Infl. length 23–25 cm., *well exserted*, grains/panicle 120–125 (Plate 14, fig. 1), long (10.68 × 2.86 × 2.06 mm.) (Plate 21, fig. 1) 1000 grain weight 28.0 gms. Outturn of rice from paddy 76% by weight, fairly responsive to fertilizers. Rice long, medium coarse, *dull white with very slight white abdomen.*

Favoured for wide adaptability and high yield.

Recommended for Lateritic tract, but can also be grown successfully in alluvial soils.

42. CHINSURAH-21 (ACHRA-108/1) (LATE)

A selection from materials introduced from Assam and recommended in 1948. Suitable for lower situation of both alluvial and lateritic soils under transplanted condition. Sown in May-June (when grown under direct sown condition but June when under transplanted condition) trnsplanted in July, flowers in end October to 1st week of November, matures in end December to 1st week of January taking a total period of 160–165 days from planting, flowering 110–120 days from planting, giving an average yield of 20–25 mds. per acre, with a yield potential of 30–32 mds. per acre, under Chinsurah condition.

Highly susceptible to Helminthosporium.

L.S.—Green, Gl.—Green, L & P—Green, Ap.—Green, Mature grain—*Yellowish to straw coloured, awnless* (Coloured Plate III, fig. 13). Habit partially spreading, non-shattering, Tillers (fertile) 8–9, height 131–133 cm., but more under water logged condition. Infl. length 26–28 cm., slightly exserted, grains/panicle 135–137 (Plate 14, fig. 2), coarse (8-60 × 3.30 × 2.25 mm.) (Plate 21, fig. 1), 1000 grains weight 25.0 gms. Outturn of rice from paddy 68% by weight. Rice coarse, white with white abdomen.

Favoured for wide adaptability and its ability to withstand water logging upto 4 to 5 feet and as broadcast aman in partially flooded areas.

Recommended for low lying areas of West Bengal having water depth between 4 to 5 feet in rainy season.

43. CHINSURAH-19 (KUMARGORE) (LATE)

A selection from local paddy varieties of Sundarban areas (24-Parganas) and released in 1948. Suitable for low saline and alluvial areas under transplanted as well as broadcast conditions. Sown in May-June (when direct sown) and June when transplanted; transplanted in July, flowers end October to November, matures in end December taking a total period of 155–160 days from planting, flowering 110–115 days from planting, giving an average yield of 23–24 mds. per acre with a yield potential of 33–34 mds. per acre under Gosaba condition.

Moderately resistant in saline areas but slightly susceptible in other regions to Helminthosporium.

L.S.—Green, Gl.—Green, L & P—Green, Ap.—Green, Mature grain—*Yellowish to dull brown colour, awnless*

(Coloured Plate III, fig. 14). Habit—partially spreading, non-shattering, Tillers (fertile) 8–9, height 138–140 cm. in water logged soils, Infl. length 26–28 cm., exserted; grains/panicle 126–128 (Plate 14, fig. 3), coarse (8.88 × 3.34 × 3.27 mm.) (Plate 21, fig. 1) 1000 grain weight 26.0 gms. Otturn of rice from paddy 80.6% by weight. Rice coarse white with white abdomen.

Favoured for partial resistance to salinity and ability to withstand late planting.

Recommended for low lying saline and non saline areas and can tolerate a depth of water, up to 3 to 3.5 feet.

44. CHINSURAH-31 (TILAKKACHARI)—(LATE)

A selection from East Pakistan varieties and released in 1948. Suitable for low situation of both alluvial and lateritic (Sit. IV) soils under transplanted condition. Sown in May–June (when grown under direct sown condition) but June under transplanted condition, transplanted in July, flowers in end October to early November, matures in end December taking a total period of 155–160 days from planting and flowering 110–115 days from planting, giving an average yield of 24–25 mds. per acre, with a yield potential of 33–34 mds. per acre, under Chinsurah condition.

Susceptible to Helminthosporium.

L.S.—Green, Gl.—Green, L & P—Green, Ap.—Green, *Mature grain—Dull light brown colour*, awnless (Coloured Plate III, fig. 15). Habit—partially spreading, non-shattering, Tillers (fertile) 6–7, height 136–138 cm. in water logged condition. Infl. length 25-27 cm., exserted, grains/panicle 118–120 (Plate 14, fig. 4), coarse (8.77 × 3.53 × 2.30 mm.) (Plate 20, fig. 4), 1000 grain weight 20.0 gms. Outturn of rice from paddy 60% by weight. Rice coarse, white with white abdomen. Straw thick with airspaces.

Favoured for its tolerance to late transplantation and 3 to 4 feet water depth.

Recommended for semi low lying areas of the State.

45. CHINSURAH-39 (KATARIBHOG) (SLIGHTLY SCENTED)

A selection from local paddy varieties of North Bengal including Dinajpur and recommended in 1953 for general cultivation. Suitable for medium alluvial soils under transplanted condition. Sown in June, transplanted in July, flowers in end 3rd week to 4th week of October, matures in 1st week of December taking a total period of 125–130 days from planting, flowering 95–100 days from planting, giving an average yied of 23–24 mds. per acre, with a yield potential of 26–27 mds. per acre, under Chinsurah condition.

Moderately resistant to Helminthosporium.

L.S.—Green, Gl.—Green, L & P—Green, Ap.—Green, *Mature grain—Yellowish to straw coloured, awnless to awned* (Coloured Plate III, fig. 10). Habit compact, non-shattering, Tillers (fertile) 15–16; height 122–124 cm., Infl. ength 27–28 cm., exserted, grains/panicle 70-72 (Plate 15, fig. 1), finc (5.59 × 1.82 × 1.43 mm.) (Plate

20, fig. 4), 1000 grain weight 15.0 gms. Outturn of rice from paddy 66.7% by weight. Rice fine, white, slightly scented, transluscent.

Favoured for fine, white secnted rice.

Recommended for West Dinajpur for the present.

46. CHINSURAH-17 (BADSHABHOG) (SCENTED)

A selection from local fine and secnted varieties and recommended in 1948. Suitable for medium to medium low alluvial soils under transplanted condition. Sown in June, transplanted in July, flowers in 3rd to 4th week of October, matures in end November to 1st week of December taking a total period of 130–135 days from planting, flowering 100–105 days from planting, giving an average yield of 20–21 mds. per acre, with a yield potential of 28–30 mds. per acre, under Chinsurah condition.

Moderately resistant to Helminthosporium and stem borer.

L.S.—Green, Gl.—Green, L & P—Green, Ap.—Green, *Mature grain—Yellowish to yellow straw coloured, awnless* (Coloured Plate III, fig. 16). Habit—compact, non-shattering, Tillers (fertile) 10–11, height 128–130 cm., Infl. length 27–28 cm., *well exserted,* grains/panicle 216 (Plate 15, fig. 3), Oval short (6.31 × 1.95 × 1.65 mm.) (Plate 21, fig. 2), 1000 grain weight 11.2 gms. Outturn of rice from paddy 72.9% by weight. Rice short, oval, white, scented, transluscent.

Favoured as fine table rice and for preparation of rice pudding ("Payesh") and "Polao" and also for its market value.

Recommended for alluvial soils of West Bengal except for saline areas and highly acidic soils.

47. BANKURA—35 (RANDHUNIPAGAL)

A selection from local fine scented group of paddy varieties and recommended in 1953 for general cultivation. Suitable for medium alluvial and medium low to low (Sit. IV) lateritic soils under transplanted condition. Sown in June, transplanted in July, flowers in 4th week of October, matures in 3rd week of November taking a total period of 125—130 days from planting, flowering 95—100 days from planting, giving an average yield of 24—25 mds. per acre, with a yield potential of 28—30 mds. per acre, under Bankura condition.

Moderately resistant to Helminthosporium.

L.S.—Purple wash, Gl.—Deep purple, L & P—Green, Ap.—Deep purple, Mature grain —Golden yellowish with slight deep purple tips (Coloured Plate III, fig. 17). Habit compact, non-shattering, Tillers (fertile) 9—10, height 89—92 cm., Infl. length 24—26 cm., *well exserted,* grains/panicle generally 225—230 (Plate 15, fig. 2), oval fine (7.9 × 2.3 × 1.8 mm.) (Plate 21, fig. 3), 1000 grain weight 13.0 gms. Outturn of rice from paddy 72% by weight. Rice fine, oval, white, scented and transluscent.

Favoured for wide adaptability and fine, white, scented, quality rice, suitable for preparation of rice pudding ("Payesh")

Recommended for lateritic tract.

48. BANKURA—33 (BASMOTI)

A selection from local scented group of paddy varieties and released in 1948. Suitable for medium low to low lands *i.e.* Situation IV of lateritic soils under transplanted condition. Sown in June, transplanted in July, flowers in 4th week of October, matures in 3rd week of November taking a total period of 125—130 days from planting. Flowering 95—100 days from transplanting, giving an average yield of 25—26 mds. per, acre with a yield potentital of 33—34 mds. per acre, under Bankura condition.

Moderately resistant to Helminthosporium.

L.S.—Green, *Gl.—Brownish tinge, L & P—Purple tinge, Ap.—Purple, Mature grain Yellowish straw coloured, with awns variable in size* (Plate III, fig. 20), *deep purple in coluour ;* Habit—partially spreading, non-shattering, partially non-lodging, tillers (fertile) 9—10, height 108—110 cm., Inffl. length 29—30 cm., *wel exserted,* grains/panicle 185—190 (Plate 15, fig. 4), medium fine (8.28×2.40×1.90 mm.) (Plate 21, fig. 2), 1000 grain weight 17.5 gms. Outturn of rice from paddy 73% by weight. Rice medium, fine, white, transluscent, scented.

Favoured for fine, white, scented and soft rice. Suitable for preparation of "Polao".

Recommended for lateritic tract.

49. CHINSURAH—41 (F.R. 13A)

An introduction from Orissa and released for general cultivation in 1953 after thorough test. Suitable for low lying alluvial soils in flooded areas under transplanted as well as direct sown conditions. Sown in early June when under direct sown condition and mid June when under transplantation, transplanted in July, flowers in the 4th week of October, matures in 1st week of December taking a total period of 140—145 days from plant-planting, flowering 100—105 days from planting, giving an average yield of 23—24 mds. per acre, with a yield potential of 27—28 mds. per acre, under Chinsurah condition.

Moderately susceptible to Helminthosporium.

L.S.—Purple tinged, Gl.—Green, L & P—Green, Ap.—Green, Mature grain—Dull straw coloured, awned (big) (Coloured Plate I, fig. 16) ; Habit—spreading, non-shattering, Tillers (fertile) 7—8, height 125—127 cm., but slightly more under submerged condition, Infl. length 22—23 cm., *not exserted,* grains/panicle 150—155 (Plate 16, fig. 2), coarse (7.8×3.1×2.0 mm.) (Plate 21, fig. 1), 1000 grain weight 25.0 gms. Outturn of rice from paddy 72% by weight. Rice coarse, red, with very slight white abdomen.

Favoured for flood resistance, can tolerate submergence up to 4 feet of water for 14 days.

Recommended for flooded areas of the State with depth of water not more than 5 to 6 feet.

50. CHINSURAH—43 (F.R. 43B)

An introduction from Orissa and released in 1953 after thorough test. Suitable for low lying alluvial soils in flooded areas under transplanted as well

as direct sown conditions. Sown in early June when direct sown and mid June when under transplantation, transplanted in July, flowers end October to 1st week of November matures in 1st to 2nd week of December taking a total period of 145—150 days from planting, flowering 105—110 days from planting, giving an average yield of 23—24 mds. per acre with a yield potential of 29—30 mds. per acre, under Chinsurah condition.

Moderately susceptible to Helminthosporium.

L.S.—Green, Gl.—Green, L & P—Green, Ap.—Green, *Mature grain—Reddish brown, awnless* (Coloured Plate I, fig. 17); Habit—compact, non-shattering, Tillers (fertile) 10—11, height 150—152 cm., more under submerged condition. Infl. length 26—28 cm., exserted, grains/panicle 147—149 (Plate 16, fig. 1), coarse (8.3×3.0×1.95 mm.) (Plate 21 fig. 1), 1000 grain weight 20.0 gms. Outturn of rice from paddy 71.5% by weight. *Rice coarse, red with prominent white abdomen.*

Favoured for flood resistance, can tolerate submergence up to 6 feet for 7 days.

Recommended for flooded areas of the State with depth of water not more than 6 to 7 feet.

51. CHINSURAH—45 (S. R. 26B)

A selection from materials introduced from Orissa and released in 1953. Suitable for saline soils under transplanted condition. Sown in June, transplanted in July, flowers in 4th week of October, matures in end November to 1st week of December taking a total period of 125—130 days from planting, flowering 95—100 days from planting giving an average yield of 27—28 mds. per acre, with a yield potential fo 35—36 mds. per acre, under Chinsurah and Gosaba conditions.

Susceptible to Helminthosporium.

L.S.—Green, Gl.—Green, L & P—Green, Ap.—Green, *Mature grain—Yellow to yellowish straw*, awnless (Coloured Plate III, fig. 18). Habit compact, non-shattering, Tillers (fertile) 8—9, height 162—164 cm., Infl. length 21—23 cm., *slightly exserted*, grains/panicle 122—124 (Plate 16, fig. 3), medium (9.7×2.7×1.9 mm.) (Plate 12, fig. 1), 1000 grain weight 26.0 gms. Outturn of rice from paddy 61.6% by weight. Rice dull white, medium, transluscent.

Favoured for resistance to salinity.

Recommended for saline tracts of 24-Parganas and Midanapore.

Identical with Patnai 23 and Patnai 298 excepting that the rice is slightly dull white in colour and shorter in size.

52. CHINSURAH—47 (N.C. 678)

A selection from local paddy varieties of Murshidabad and recommended in 1960. Suitable for medium low situation of alluvial tracts under transplanted condition. Sown in June, transplanted in July, flowers in 4th week of October, matures in 1st week of December taking a total period of 140—145 days from transplanting, flowering 100—105 days from transplanting, giving an average yeield of 34—35 mds. per acre, with a yield potential of 45—46 mds. per acre, under Chinsurah condition.

Moderately resistant to Helminthoporium.

L.S.—Light purple, Gl,.—Purple, L & P—Light purple, Ap.—Purple, Mature grain—Golden brown to dull yellow, awned to tipped (Coloured Plate II, fig. 2). Habit partially spreading non-shattering, partially non-lodging, tillers (fertile) 7—8, height 158—160 cm., Infl. length 30—31 cm., *exserted*, grains/ panicle 165—170 (Plate 17, fig. 1), coarse (9.29 × 3.33 × 2.23 mm.) (Plate 21, fig. 3), 1000 grain weight 29.0 gms. Outturn of rice from paddy 72.5% by weight. Rice coarse, *almond white with slight white abdomen.*

Favoured for high yield in medium low situation.

Recommended for Hooghly and Murshidabad district for the present.

53. CHINSURAH—49 (N.C. 1281)

A selection from local varieties of 24-Parganas and recommended in 1960. Suitable for low lands of alluvial soils under transplanted condition. Sown in June, transplanted in July, flowers 1st week of November, matures in 2nd to 3rd week of December taking a total period of 145—150 days from planting, flowering 110—115 days from planting, giving an average yield of 37—38 mds. per acre. with a yield potential of 50—52 mds. per acre, under Chinsurah condition.

Moderately resistant to Helminthosporium.

L.S.—Green, Gl.—green, L & P—Green, Ap.—Green, *Mature grain—Bright golden yellow* awnless (Coloured Plate II, fig. 3) ; Habit compact, erect, non-shattering, Tillers (fertile) 9—10, height 145—147 cm., Infl. length 26—28 cm. *slightly exserted*, grain/panicle 225—230 (Plate 17, fig. 2), oval coarse (6.82 × 3.35 × 2.37 mm.) (Plate 21, fig. 3), 1000 grain weight 23.5 gms. Outturn of rice from paddy 84.3% by weight. Rice—short, *dull white, coarse oval* with white abdomen.

Favoured for high yield. Raises the earhead when lodged under adverse weather condition.

Recommended for low areas of alluvial tracts specially 24-Parganas and Hooghly.

54. CHINSURAH—51 (O.C. 1393)

A selection from local materials of 24-Parganas and released in 1960. Suitable for low lands of alluvial tracts under transplanted condition. Sown in June, transplanted in July, flowers in 1st week of November, matures in 2nd to 3rd week of December taking a total period of 145—150 days from transplanting, flowering 110—115 days from transplanting, giving an average yield of 34—35 mds. per acre with a yield potential of 44—45 mds. per acre, under Chinsurah condition.

Moderately resistant to Helminthosporium.

L.S.—Green, G.l.—Green, L & P—Green, Ap.—Green, Mature grain—*Golden yellowish, awned* (Coloured Plate II, fig. 1) ; Habit compact, erect, non-shattering, Tillers (fertile) 12—13, height 164—166 cm., Infl. length 30—32 cm., *slightly exserted*, grains/panicle 135—140 (Plate 17, fig. 3), medium coarse (8.35 × 3.02 × 2.22 mm.) (Plate 21, fig. 3), 1000 grain weight 29.0 gms. Outturn of rice

from paddy 79.4% by weight. Rice, medium coarse, dull white with slight white abdomen.

Favoured for high yield and raising the earhead when lodged under adverse condition. Straw very thick, with air spaces.

Recommended for 24 Parganas and Hooghly for the present.

HILL PADDY

55. M.P.R.S.—1(C.N.A.B. 4)

An introduction from China and released in 1955 for general cultivation. Suitable for hilly regions between altitudes of 2000 and 3500 feet under transplanted condition. Sown in 1st half of June, transplanted in 1st half of July, flowers in end September, matures in end October to 1st week of November taking a total period of 110—115 days from transplanting depending on temperature; flowering 70—75 days from transplanting, giving an average yield of 22—23 mds. per acre with a yield potential of 27—28 mds. per acre, under Kalimpong condition.

Moderately susceptible to Helminthosporium and blast.

L.S.—Green, Gl.—Green, L & P—Green, Ap.—Green, Mature grain—*Straw coloured with slight purplish tip, awnless, with prominent ridges* (Coloured Plate I, fig. 13); Habit—erect, partially shattering, non-lodging, Tillers (fertile) 11—12, height 128—130 cm., Infl. length 26—27 cm. slightly exserted, grains/panicle 198—200 (Plate 19, fig. 2), coarse (8.3×3.8×2.7 mm.) (Plate 22, fig. 2), 1000 grain weight 24.0 gms. Outturn of rice from paddy 85.7% by weight. *Rice white coarse*, with slight white abodomen.

Favoured for high yield and early maturity among hill varieties.

Recommended for Darjeeling District between altitudes of 2000 feet and 3500 feet.

56. M.P.R.S. 2 (RAMTULASI)

A selection from local materials of Darjeeling district and recommended in 1955 for general cultivation. Suitable for hilly regions between altitudes of 2000 feet and 3500 feet under transplanted condition. Sown in June, transplanted in July, flowers in middle to 3rd week of October, matures in 3rd to 4th week of November taking a total period of 130—135 days from transplanting. Flowering 90—95 days from transplanting, giving an average yield of 17—18 mds. per acre with a yield potential of 21—22 mds. per acre, under Kalimpong condition.

Moderately susceptible to diseases.

L.S.—Green, Gl.—Green, L & P—Green, Ap.—Green, *Mature grain—Dirty brown in colour*, awnless (Coloured Plate I, fig. 14); Habit—erect, partially non-shatt ering, partially non-lodging, Tillers (fertile) 15—16, height 140—142 cm., Infl. length 30—32 cm., *exserted*, grain/panicle 156—158 (Plate 19, fig. 3), medium (6.3×3.6× 2.9 mm.) (Plate 22, fg. 2), 1000 grain weight 19.5 gms., Outturn of rice from paddy 86% by weight. Rice, white, oval, short, medium with very slight white abdomen and slightly scented.

Favoured as scented white rice among hill varieties, suitable for "Polao".

Recommended for Darjeeling district between altitudes of 2000 feet and 3500 feet.

57. M.P.R.S.—3 (ADDAY)

A selection from local materials of Darjeeling district and released in 1955 for general cultivation. Suitable for hilly regions between altitudes of 2500 feet and 4500 feet under transplanted condition. Sown in June, transplanted in July, flowers in 1st or 2nd week of October, matures in 3rd week to 4th week of November, taking a total period of 130—135 days from transplanting. Flowering 85—90 days from transplanting, giving an average yield of 17—18 mds. per acre, with a yield potential of 25—26 mds. per acre, under Kalimpong condition.

Moderately susceptible to Helminthosporium and blast.

L.S.—Green, Gl.—Green, L. & P—Green, Ap.—Green, Mature grain—*Slightly yellowish straw coloured, awnless* (Coloured Plate I, fig. 15) ; Habit—erect, partially non-shattering, partially non-lodging, Tillers (fertile) 12—14, height 143—145 cm., Infl length 24—25 cm., *exserted*, grains/panicle 182—184 (Plate 19, fig. 1), coarse (6.9×3.4×2.4 mm.) (Plate 22, fig. 2), 1000 grain weight 20.0 gms. *Outturn of rice from paddy 82% by weight.* Rice coarse white with slight white abdomen.

Favoured for Preparation of pressed rice ("Chira") and locally popular as parboiled rice.

Recommended for Darjeeling district between altitudes of 2500 feet and 4500 feet.

BORO OR SPRING PADDY

58. CHINSURAH BORO—1 (C.B.—1)

A selection from local Boro paddy materials of Hooghly district and released in 1956 for general cultivation. Suitable for Boro paddy areas of West Bengal for both Boro (winter) and Kharif seasons under transplanted condition. Sown in early November, transplanted in December, flowers in March, matures in end April to 1st week of May taking a total period of 140-145 days from trnsplanting. Flowering 95—105 days from transplanting, depending on temperature and day length, giving an average yield of 25—26 mds. per acre, with a yield potential of about 52 mds. per acre, under Chinsurah condition.

Moderately resistant to Helminthosporium.

L.S.—Light purple, Gl.—Green, L & P—Green, *Ap.—Purple*, Mature grain—*Brownish black to greyish black, sometimes with partially pale brown patch on one side, awned*, (Coloured Plate I, fig. 18) ; Habit spreading, partially shattering, Tillers (fertile) 20—21, height 82—84 cm., Infl. length 18— 20 cm., grains/panicle 100—105 (Plate 18, fig. 2), medium coarse (8.02×2.94×2.03 mm.) (Plate 22, fig. 1), 1000 grain weight 21.0 gms. Outturn of rice from paddy 77% by weight. *Rice medium coarse, red, with white abdomen.*

Favoured as a high yielding Boro Paddy in the state.

Recommneded as Boro paddy for the State.

59. CHINSURAH BORO—2 (C.B.—2)

A selection from local Boro paddy materials of Midnapore district and released in 1956 for general cultivation.

Suitable for Boro areas of West Bengal under transplanted condition. Sown in November, transplated in mid. December, flowers in 3rd week of March to 1st week of April, depending on climatic factors, matures in end April taking a total period of 140—145 days. Flowering in 95—105 days from transplanting, depending on temperature and daylength, giving an average yield of 23—24 mds. per acre, with a yield potential of 45 mds per acre, under Chinsurah condition.

Moderately resistant to Helminthosporium.

L.S.—light purple, Gl.—Green, L & P *Green, Ap.—Light purple, Mature grain—Brownish (ridges straw colour), awned* (Coloured Plate I, fig. 19) ; Habit—erect, partially shattering, Tillers (fertile) 16—17, height 82—83 cm., Infl. length 18—20 cm., grains/panicle 90—100 (Plate 18, fig. 1), medium (7.57 × 2.74 × 2.04 mm.) (Plate 22, fig. 1), 1000 grain weight 25.0 gms. Outturn of rice from paddy 79% by weight. *Rice medium, red.*

Favoured for its medium rice among Boro varieties.

Recommended as Boro paddy for the State.

60. D.A.—5

A selection from materials obtained from East Pakistan and recommended in 1957. Suitable for boro areas of West Bengal under transplanted condition. Sown in November, transplanted in mid. December, flowers in end March to 1st week of April, matures end April to 1st week of May, taking a total period of 140—145 days from taransplanting. Flowering 95–105 days from transplanting, depending on temperature and day length, giving an average yield of 13–14 mds. per acre, with a yield potential of 19–20 mds. per acre, under Chinsurah condition.

Moderately resistant to Helminthosporium.

L.S.—Green, *Gl.—Slightly pinkish*, L & P—Green, *Ap.—Purple, Mature grain—Yellowish straw coloured with deep purple tinge*, (Coloured Plate I, fig. 20); Habit erect, non-shattering, Tillers (fertile) 15–16, height 81–83 cm., Infl. length 17–19 cm., grains/panicle 120–130 (Plate 18, fig. 3), medium (6.38 × 2.64 × 1.96 mm.) (Plate 22, fig. 1), 1000 grain weight 26.0 gms. Outturn of rice from paddy 78% by weight. Rice medium, dull white, slightly scented, with white abdomen.

Favoured for white and slightly scented rice amongst boro varieties.

Recommended as scented boro variety for West Bengal.

ACKNOWLEDGEMENT

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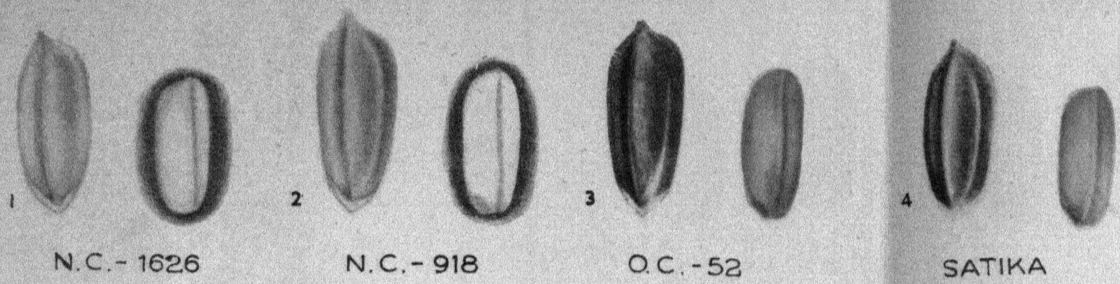
A. K. PAUL
HEAD OF THE ECONOMIC BOTANY SECTION
West Bengal.

PLATE - I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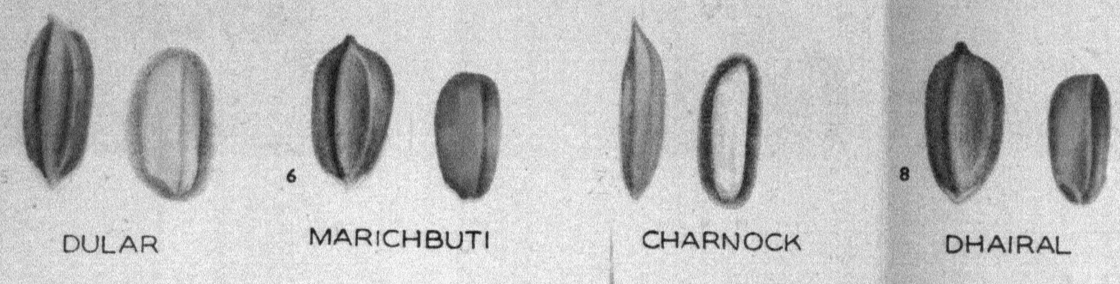
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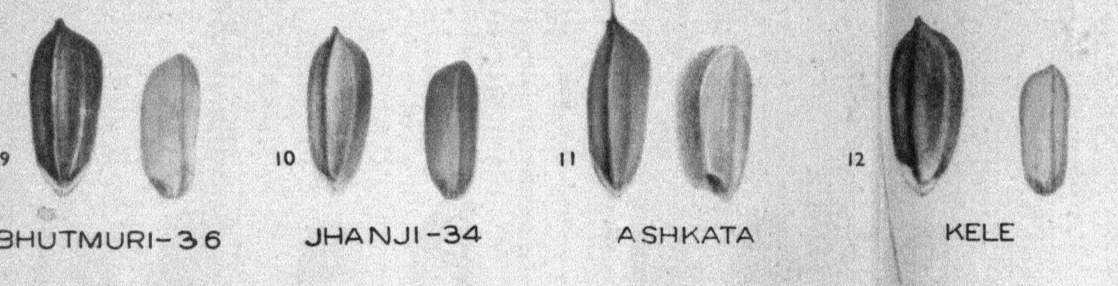
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ASHKATA
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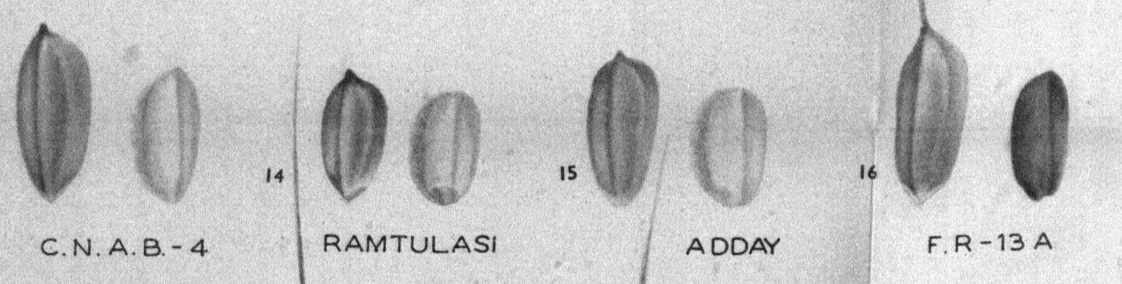
KELE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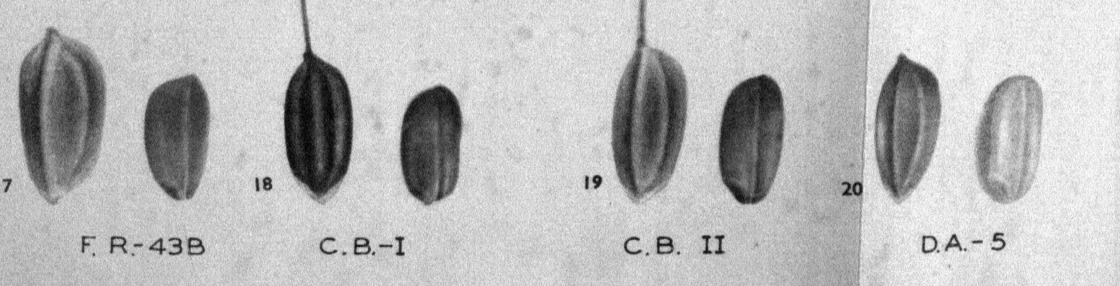
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C.B. II
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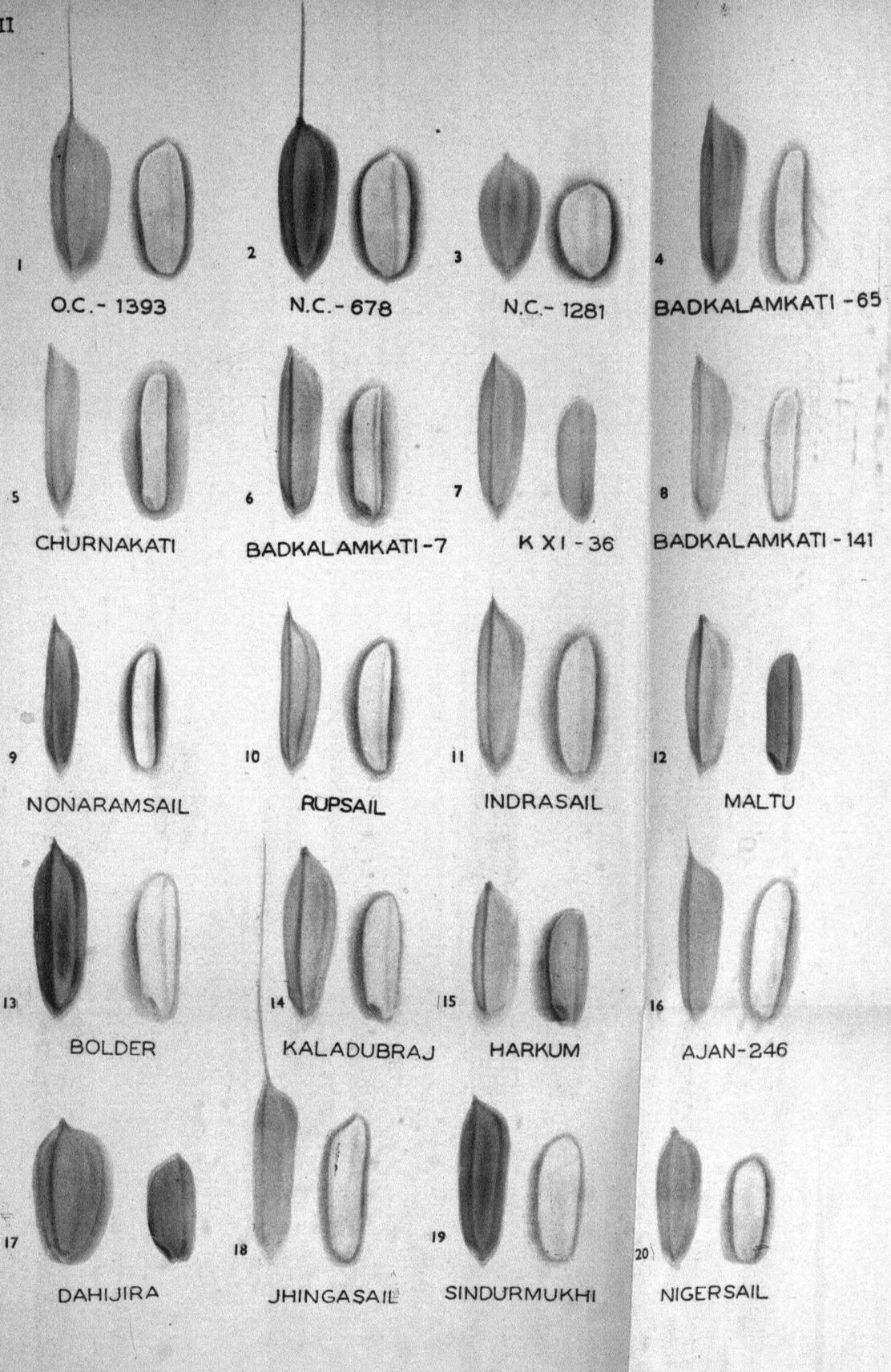
D.A.-5

PLATE-II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K X I - 36
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NONARAMSAIL
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INDRASAIL
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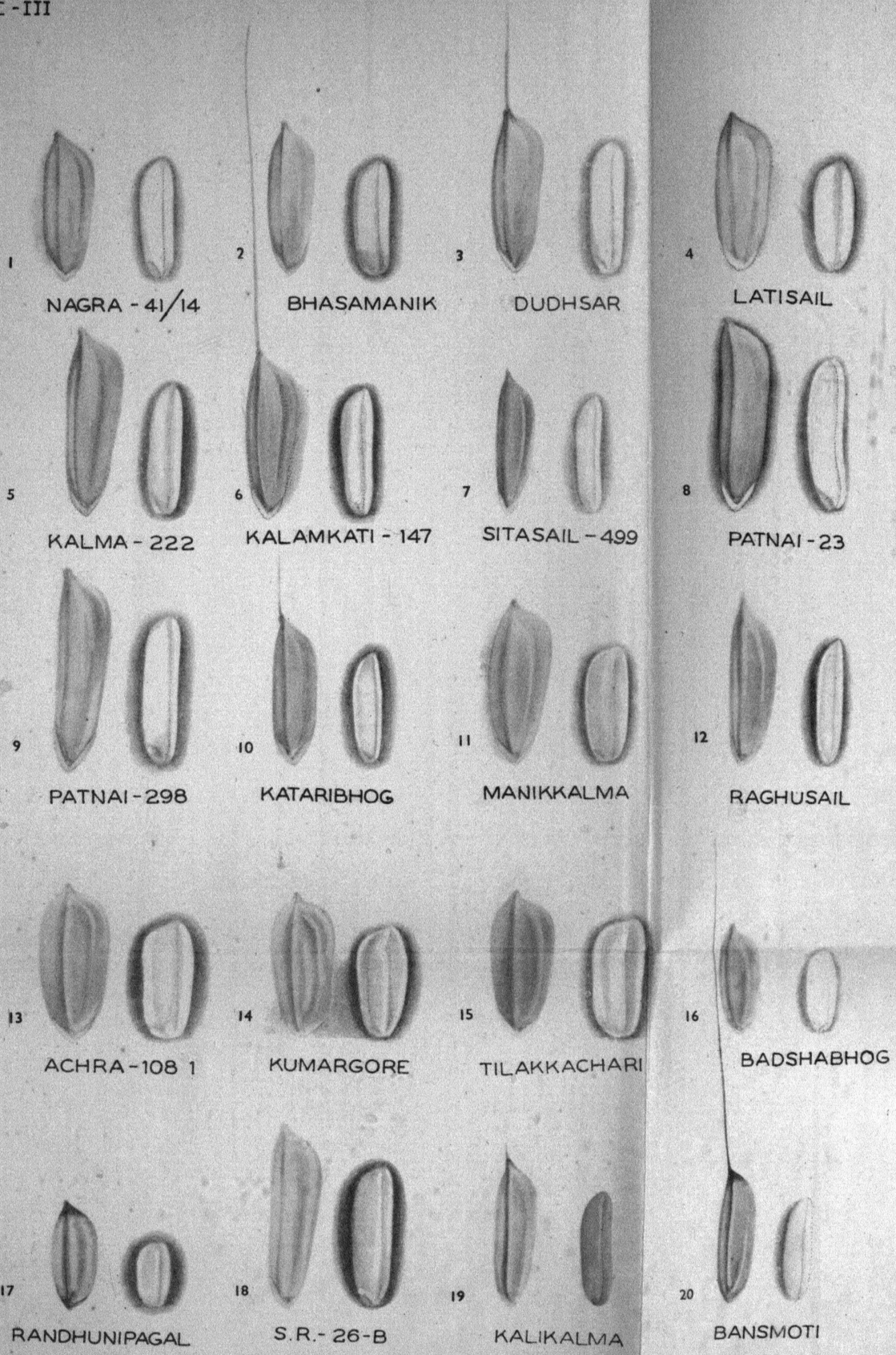
PLATE - III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PATNAI - 23
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KATARIBHOG
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MANIKKALMA
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RAGHUSAIL
13
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14
KUMARGORE
15
TILAKKACHARI
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S.R.- 26-B
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KALIKALMA
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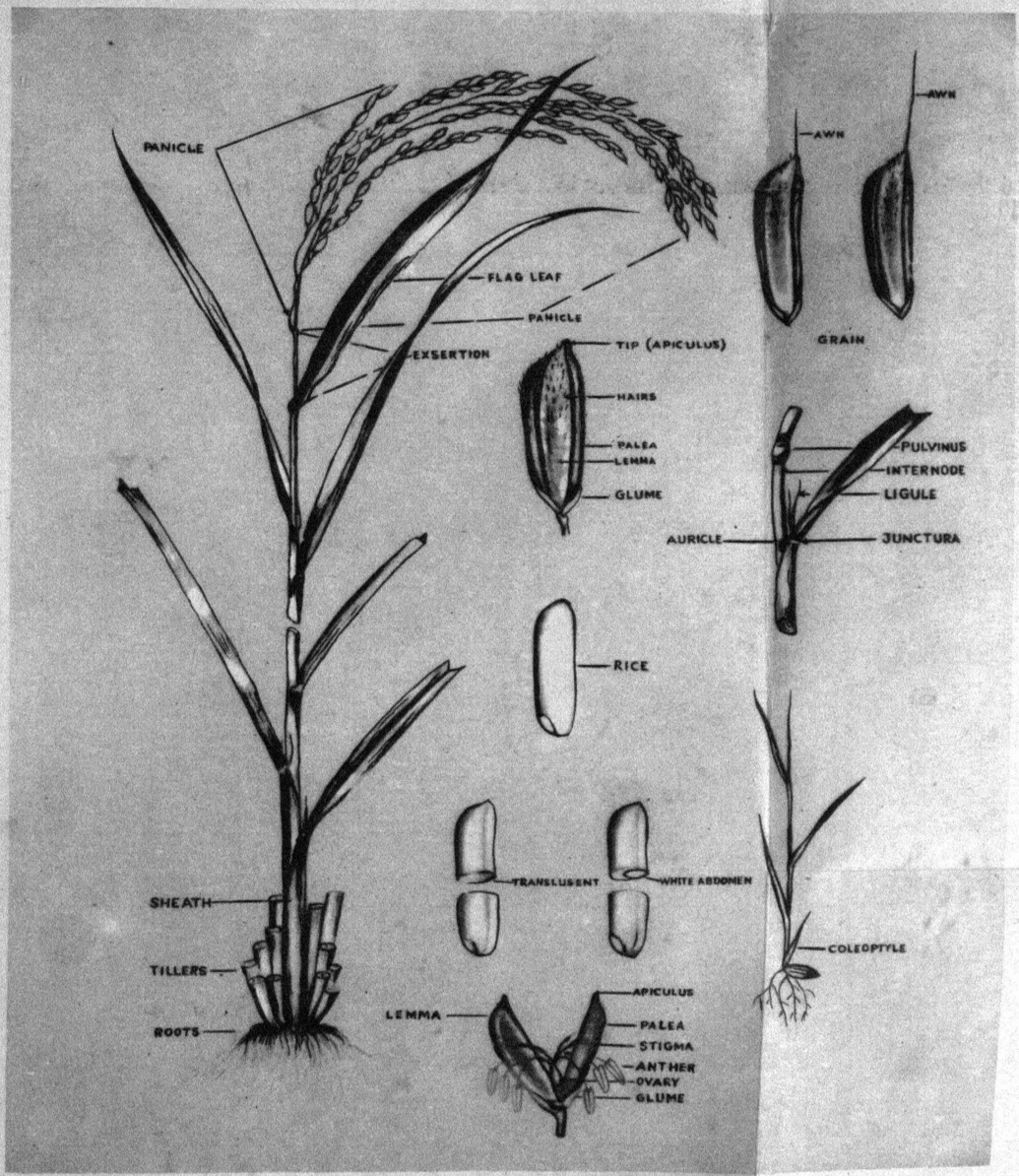
BANSMOTI

PLATE - I



A PADDY PLANT SHOWING ITS DIFFERENT PARTS IN DETAILS.

PLATE - 2

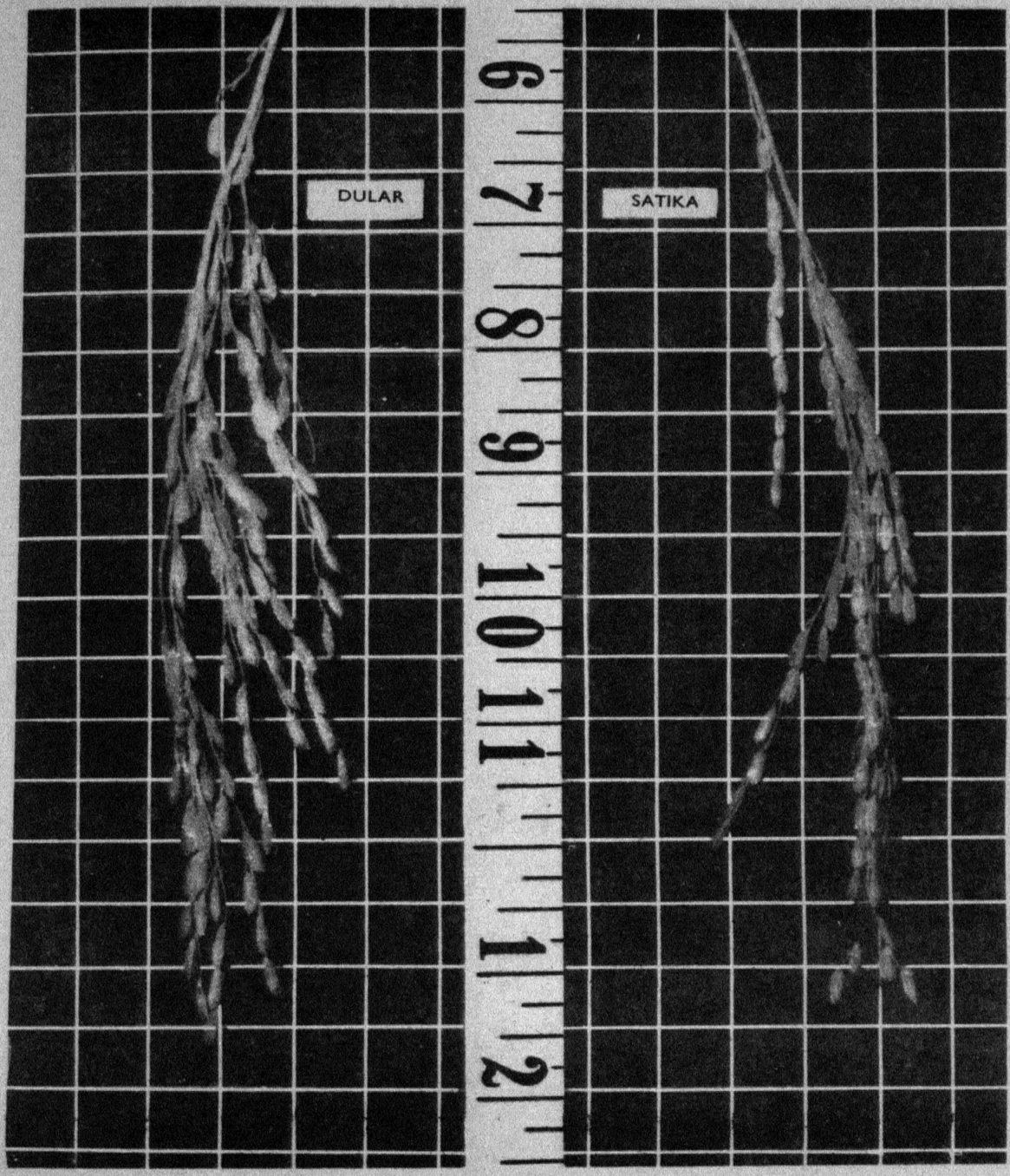


Fig. 1
Showing a panicle of Dular. Note the partially exsertion at the base.

Fig. 2
Showing a panicle of Satika. Note the basal exserted portion.

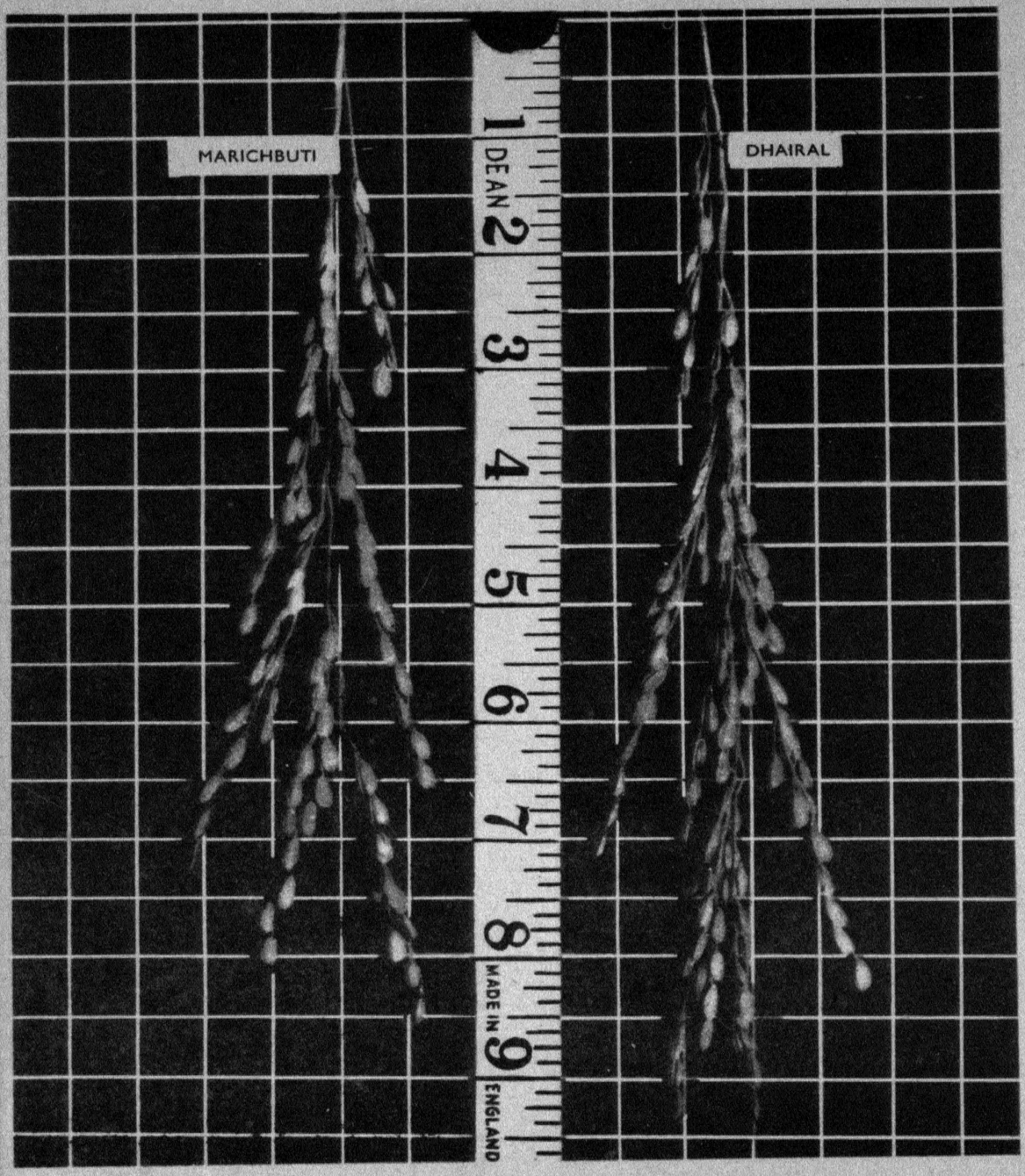


Fig. 3
Showing a panicle of Marichbuti. Note the exsertion at the base and panicle habit intermediate.

Fig. 4
Showing a panicle habit of Dhairal. Note the exsertion at the base, habit of the panicle intermediate.

Plate-3

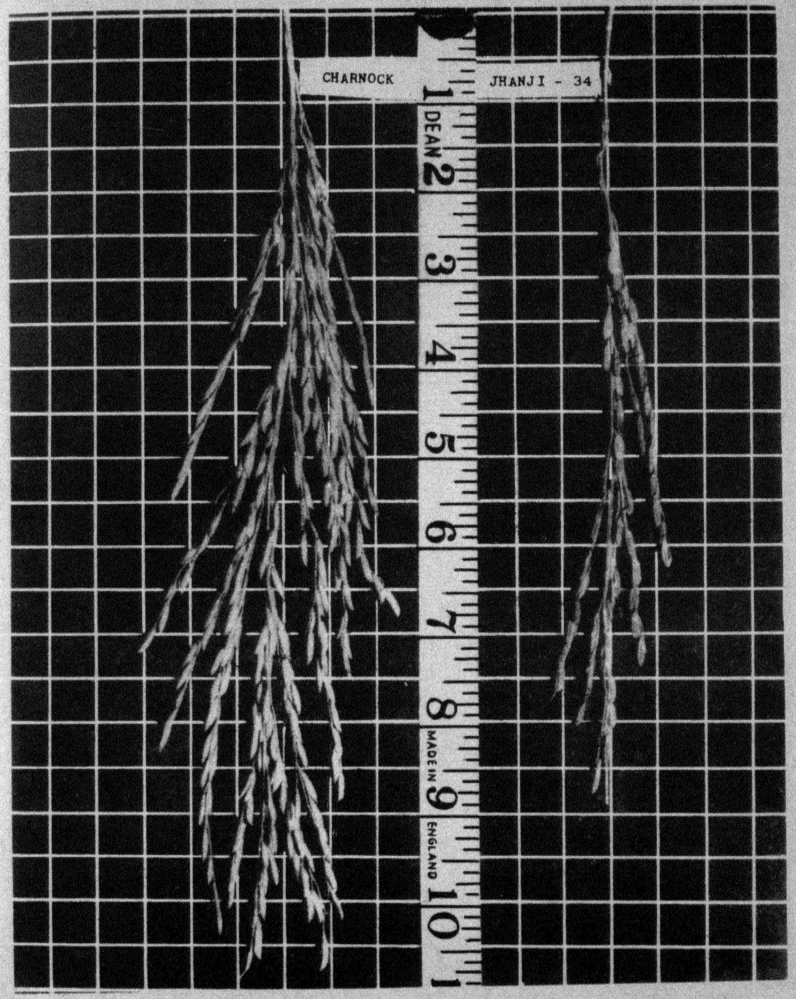


Fig. 1
Showing a panicle of Charnock
Note exsertion at the base and closely set fine grains.

Fig. 2
Showing a panicle of Jhani—34.
Note the well exserted base of the panicle, short in size.

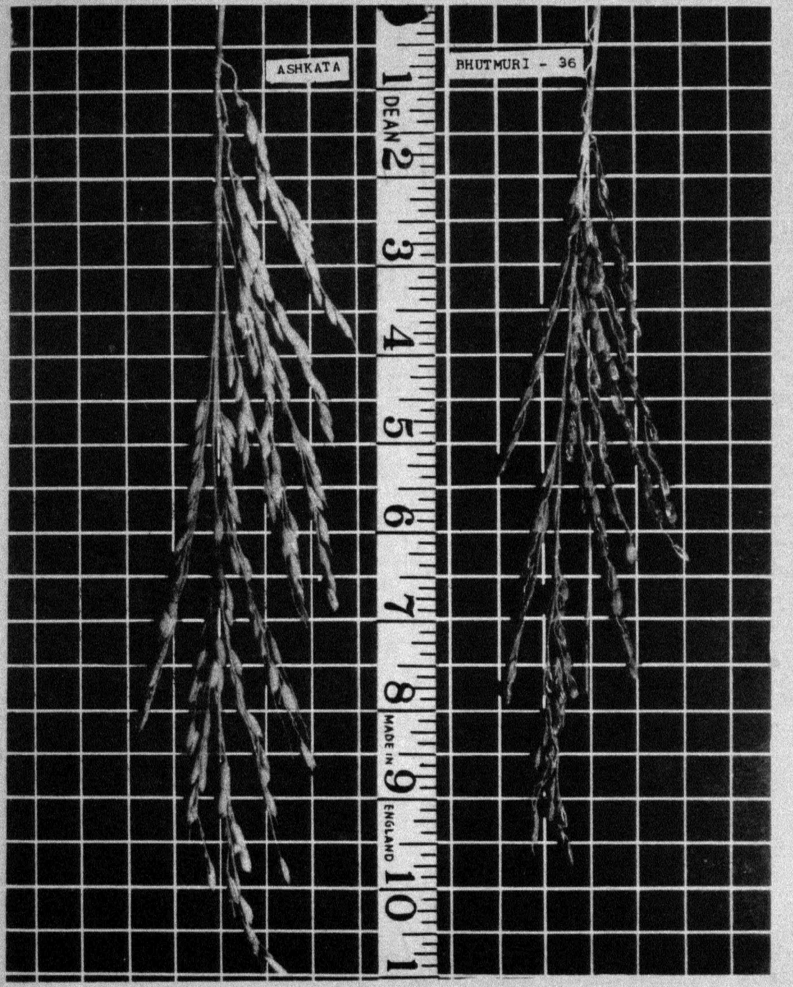


Fig. 3
Showing a panicle of Ashkata.
Note the exsertion.

Fig. 4
Showing a panicle of Bhutmuri.
Note the well exserted basal portion of the panicle.

PLATE- 4

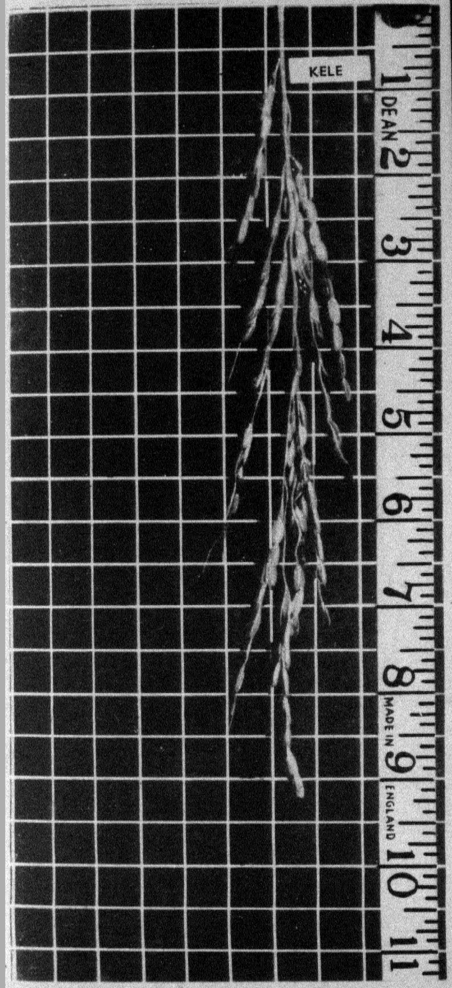


Fig. 1
Showing a panicle of Kele with exsertion. Note a few grains in the panicle are awned.

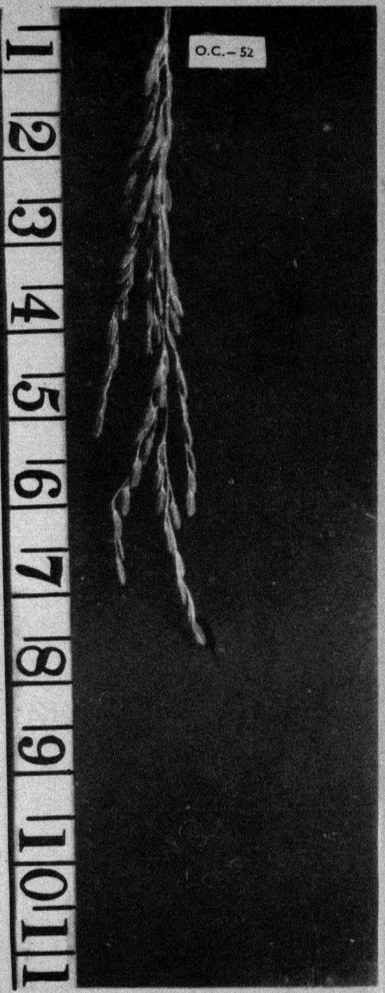


Fig. 2
Showing a panicle of O. C. 52. Note the slight exsertion and short sized panicle with closely set grains.

Fig. 3
Showing a panicle of N. C. 1626. Note the well exserted and medium sized panicle with closely set small grains.

Fig. 4
Showing a panicle of N. C. 918. Note the exsertion. Grains are closely set.

Plate-5

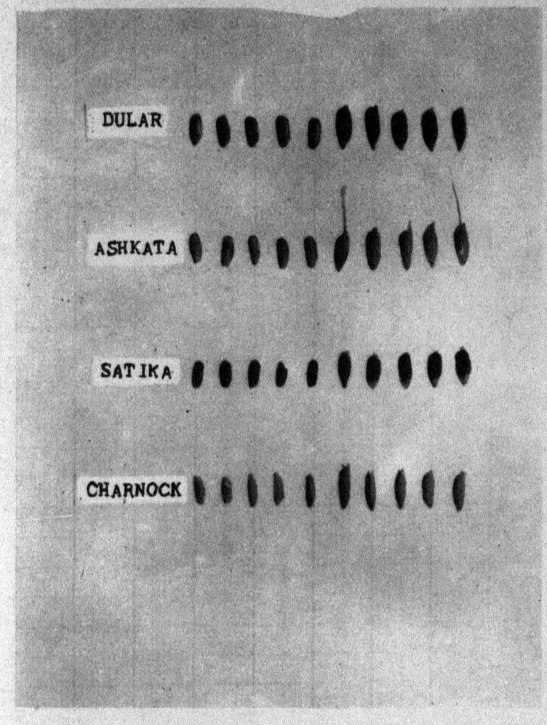


Fig. 1

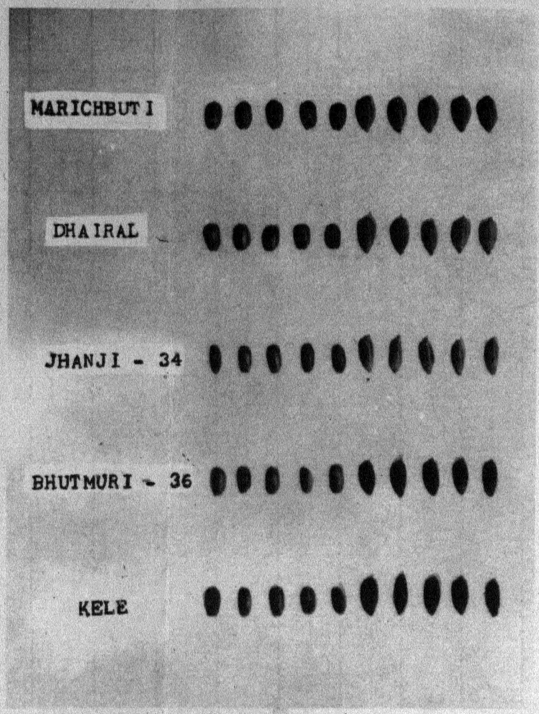


Fig. 2

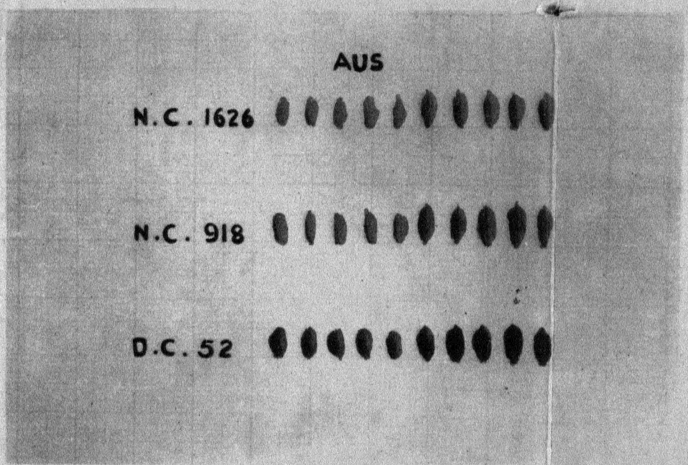


Fig. 3

PLATE - 6

Fig. 1

Fig. 2

Fig. 3

Fig. 4

Plate-7

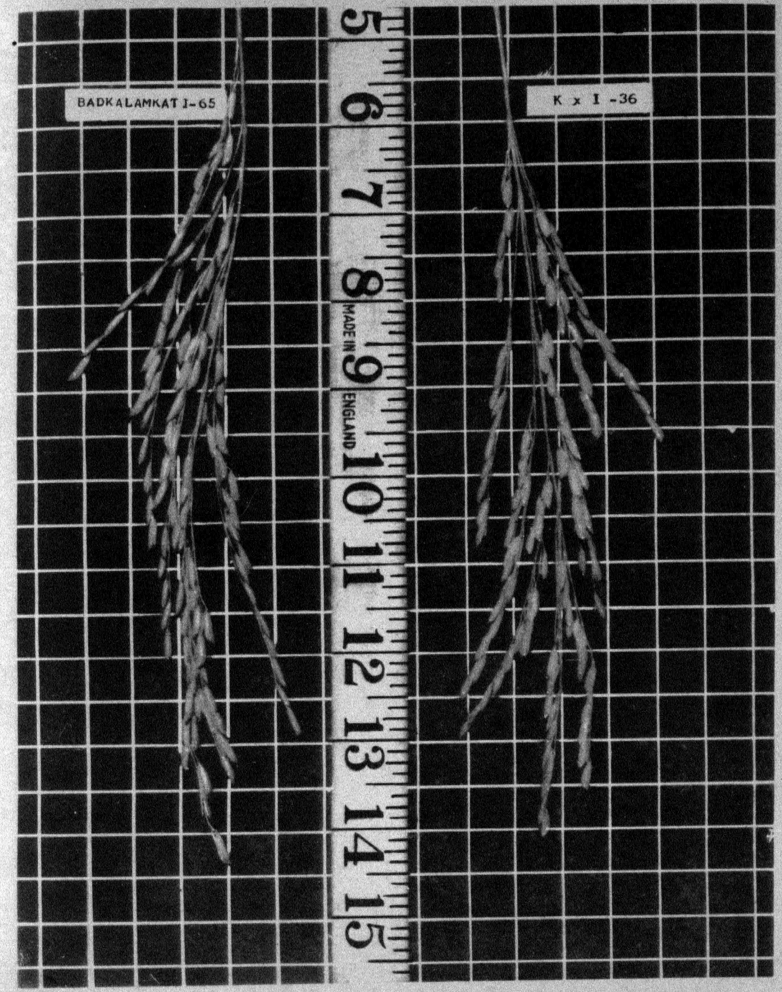


Fig. 1
Showing a panicle of Badkalamkati - 65. Note the well exserted base.

Fig. 2
Showing a panicle of K x I – 36. Note the well exserted base of the panicle.

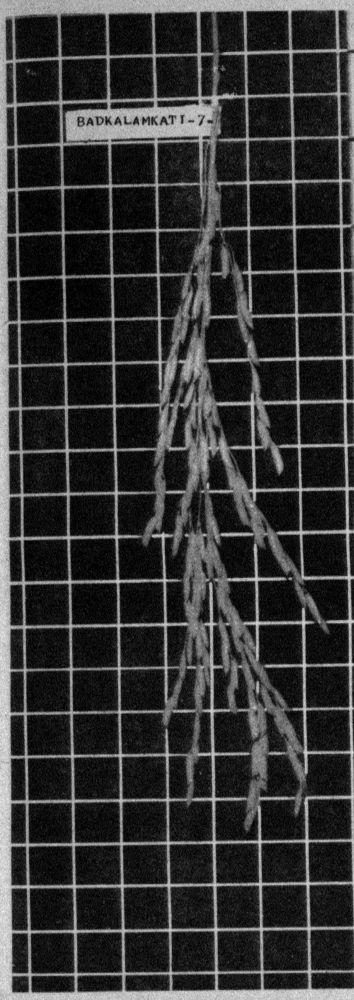


Fig. 3
Showing a panicle of Badkalamkathi – 7. Note the well exserted base with medium fine grains.

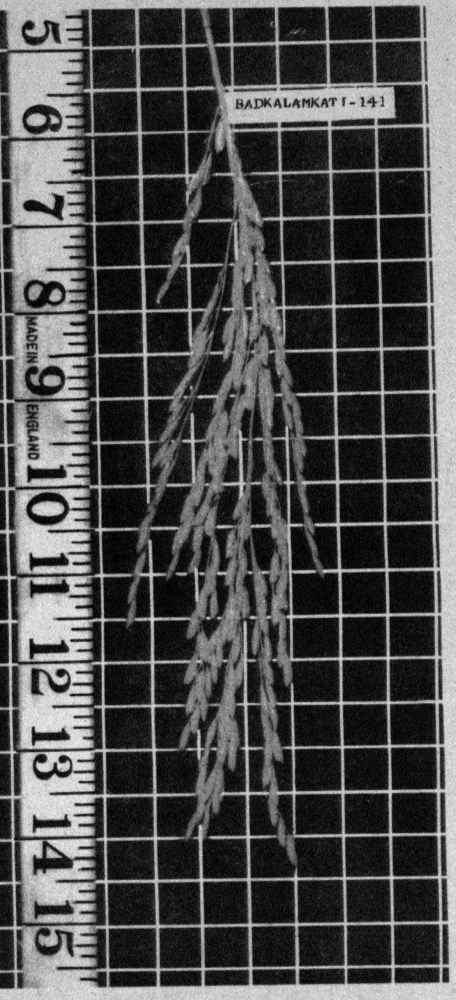


Fig 4
Showing a panicle of Badkalamkathi—141. Note the compact panicle with closely set grains.

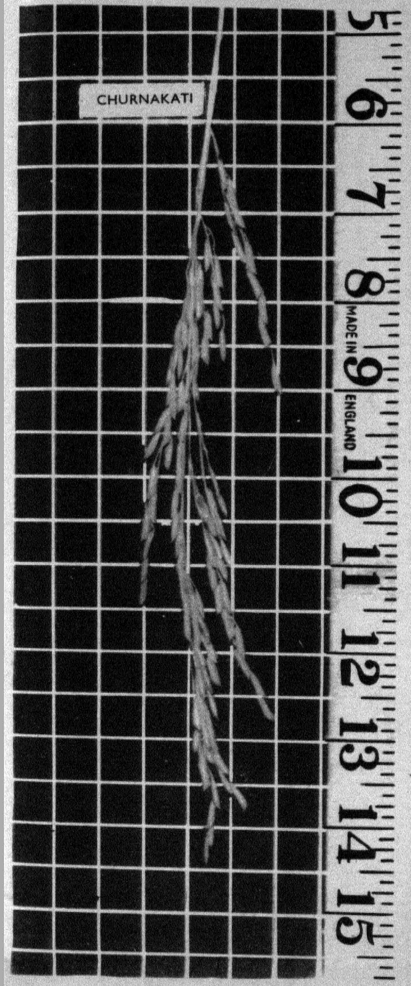


Fig. 1
Showing a panicle of Churnakathi. Note the exsertion.

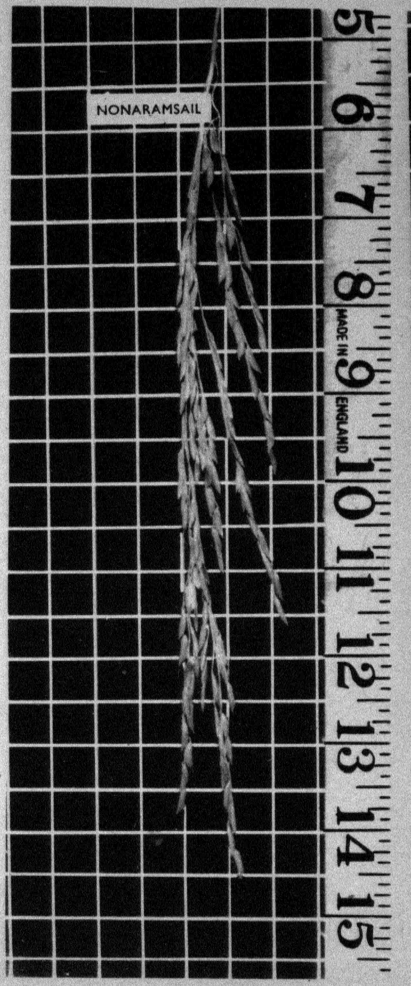


Fig. 2
Showing a panicle of Nonaramsail. Note the exsertion and fine grains.

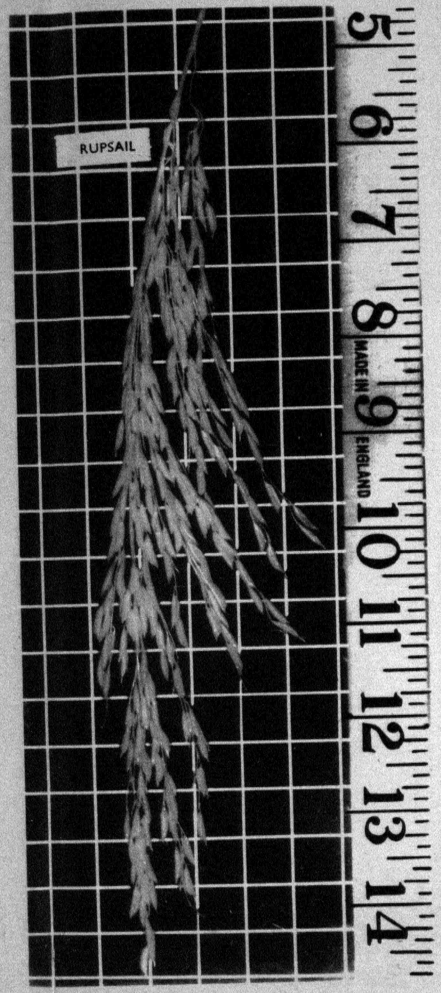


Fig. 3
Showing a panicle of Rupsail. Note the well set medium fine grains.

Fig. 4
Showing a panicle of Indrasail. Note the long bold slightly tipped grains.

Plate - 9

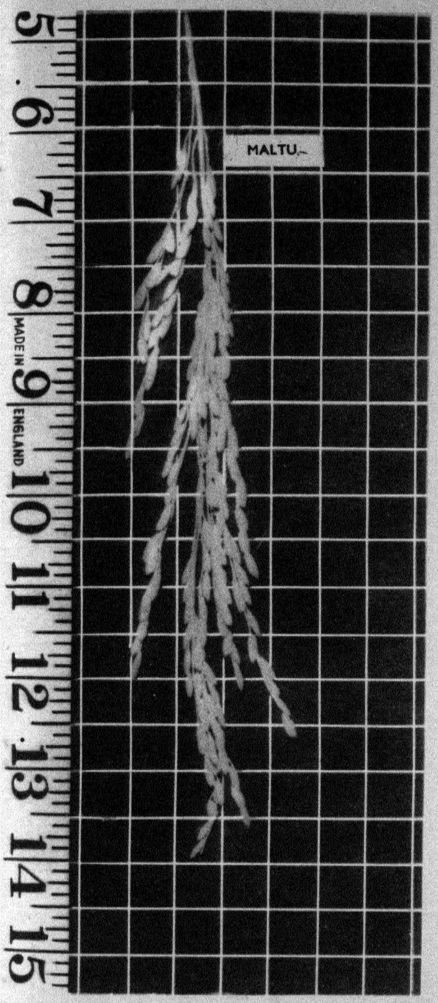


Fig. 1
Showing a panicle of Maltu. Note the well exserted basal portion of the panicle.

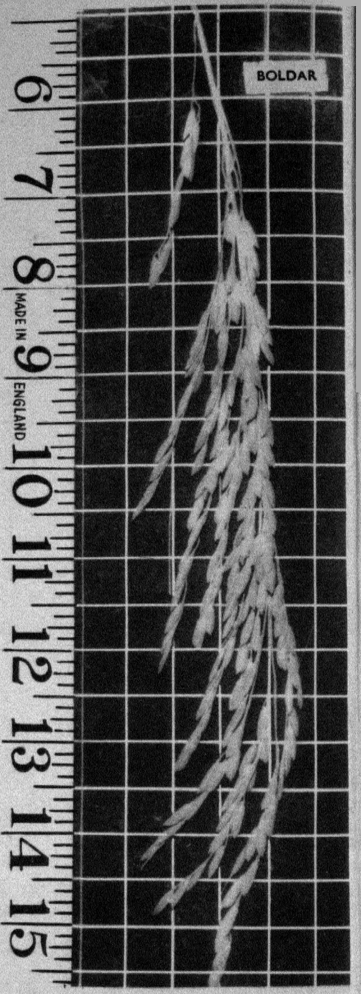


Fig. 2
Showing a panicle of Boldar. Note the well exserted base and bold awned grains.

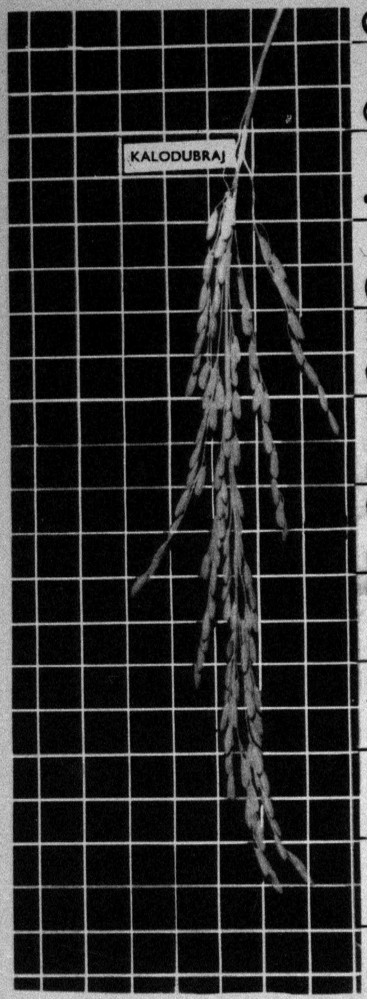


Fig. 3
Showing a panicle of Kaladubraj. Note the well exserted panicle.

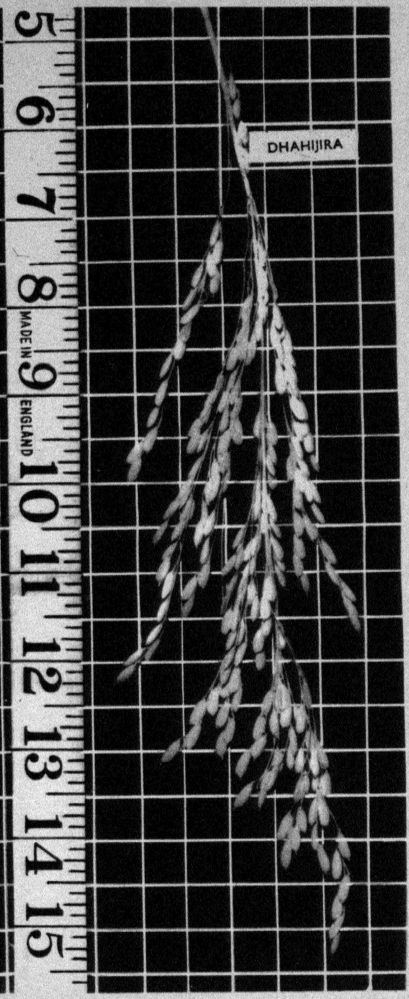


Fig. 4
Showing a panicle of Dahijira. Note the inserted basal portion and bold grains.

Plate-10

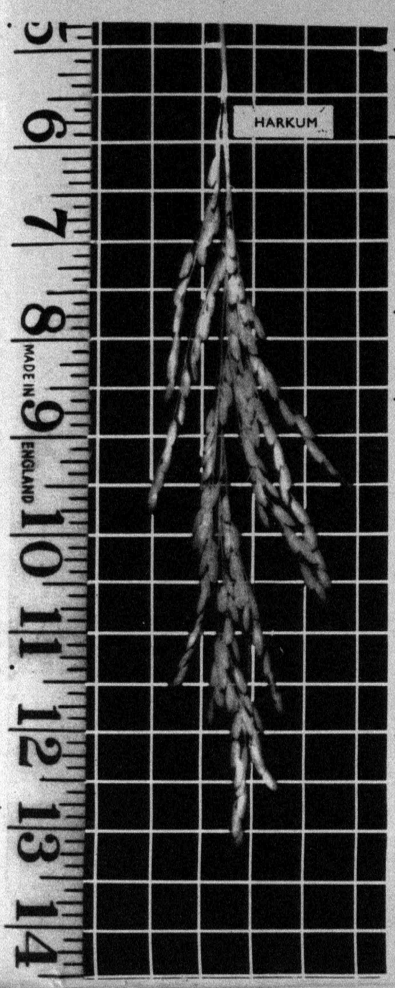


Fig. 1
Showing a panicle of Harkum. Note the exsertion.

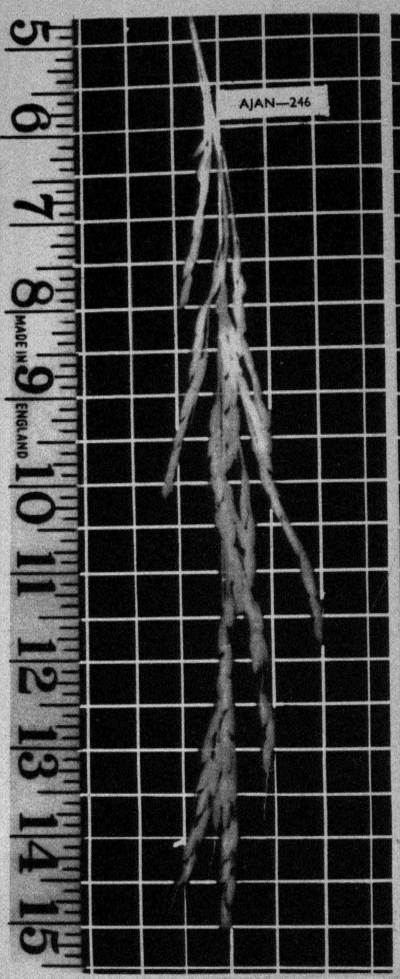


Fig. 2
Showing a panicle of Ajan 246. Note the well exserted base and long grains with awns.

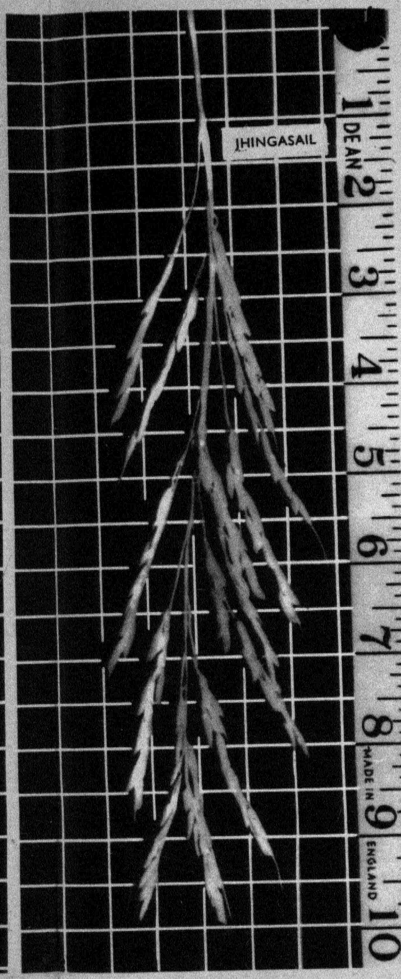


Fig. 3
Showing a panicle of Jhingasail. Note the well exserted basal portion and closely set bold grains.

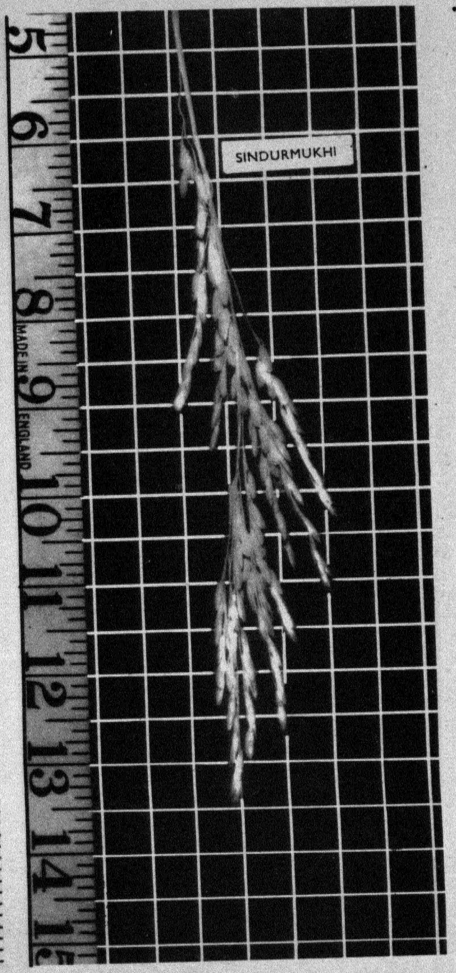


Fig. 4
Showing a panicle of Sundermukhi. Note the well exserted basal portion and closely set bold grains.

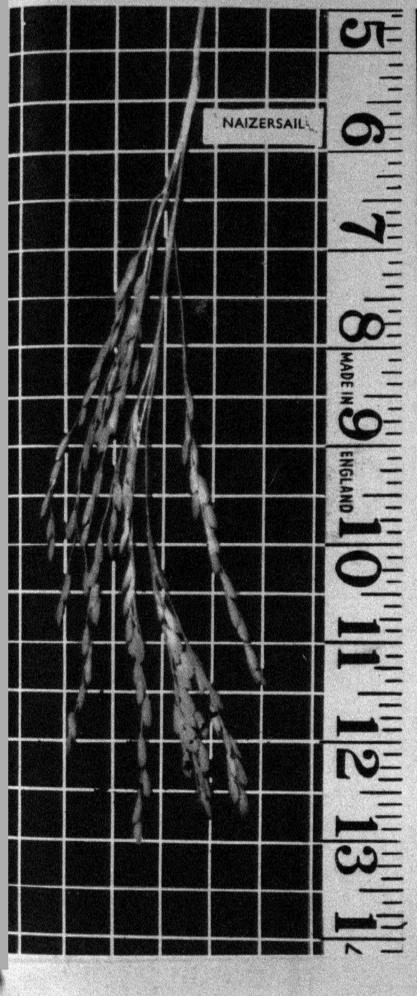


Fig. 1
Showing a panicle of Nigersail.
Note slight exsertion at the base.

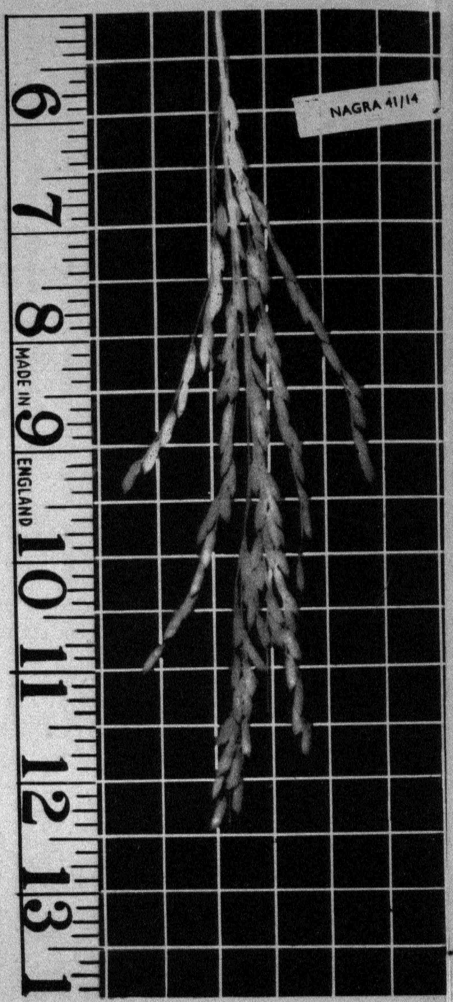


Fig. 2
Showing a panicle of Nagra 41/14.
Note the exsertion.

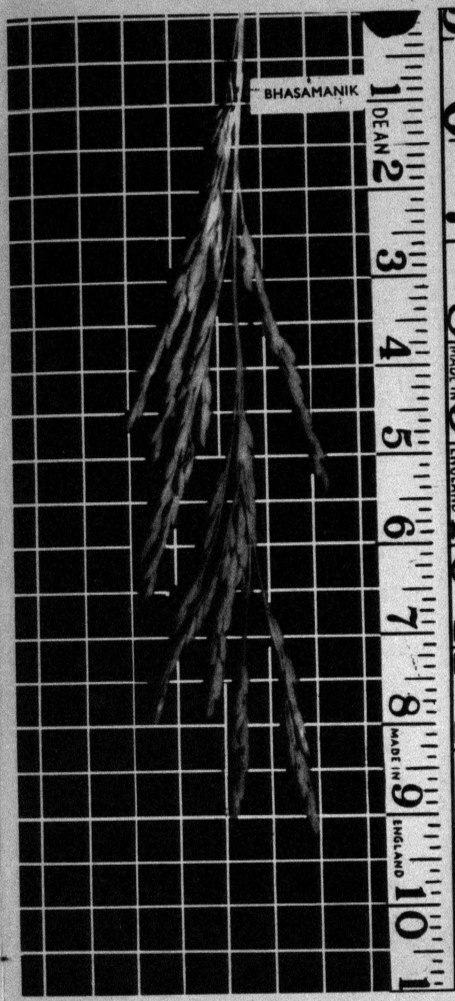


Fig. 3
Showing a panicle of Bhasamanik.

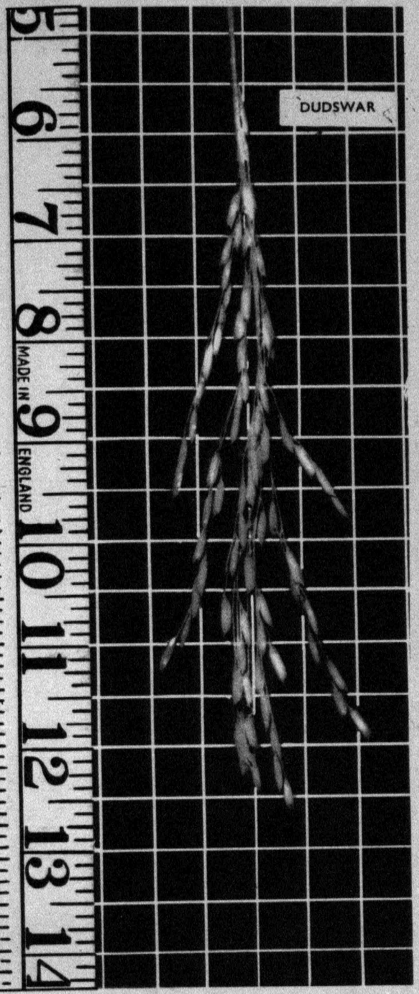


Fig. 4
Showing a panicle of Dudswar.
Note the exsertion and tipped to awned grains (Specially top grains.)

Plate-12

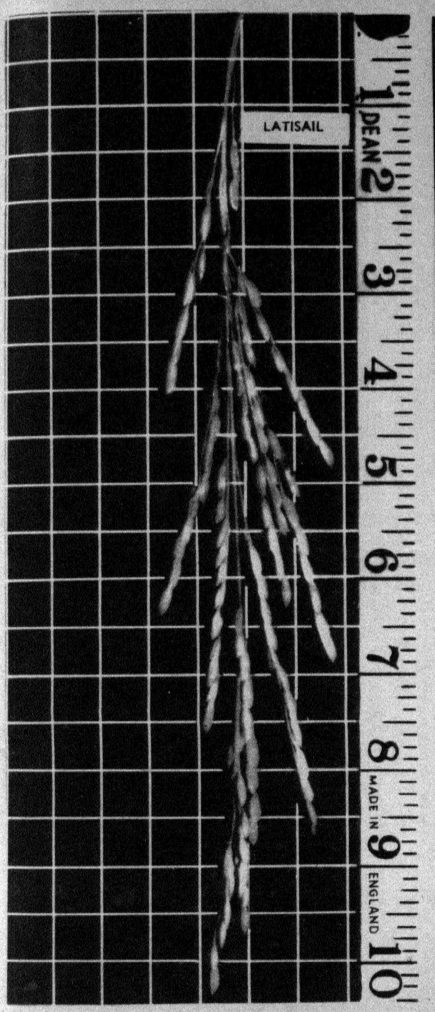


Fig. 1
Showing a panicle of Latisail.
Note the exsertion.

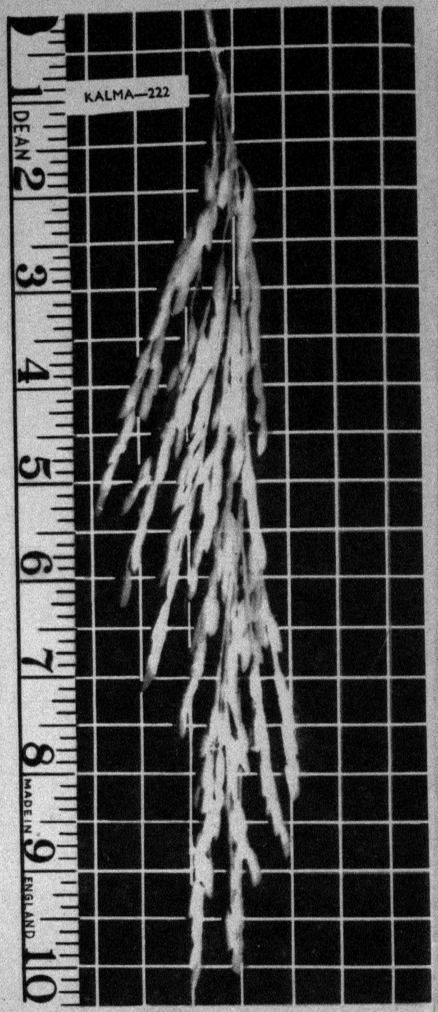


Fig. 2
Showing a panicle of Kalma 222.
Note the closely set, long, bold grains.

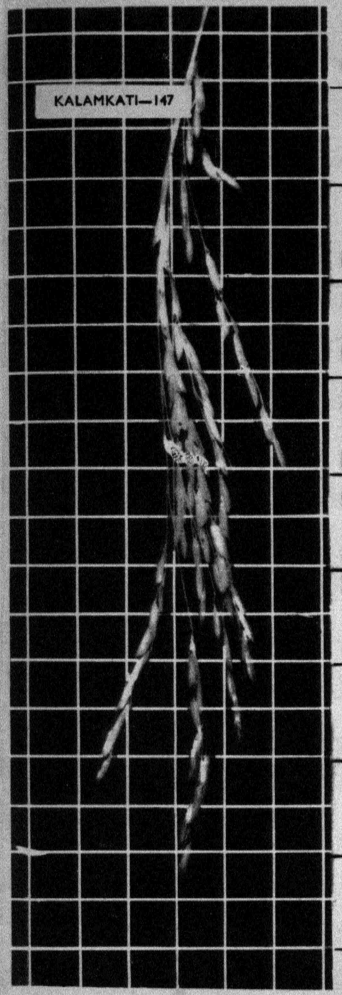


Fig. 3
Showing a panicle of Kalamkati 147. Note the medium long grains with awns.

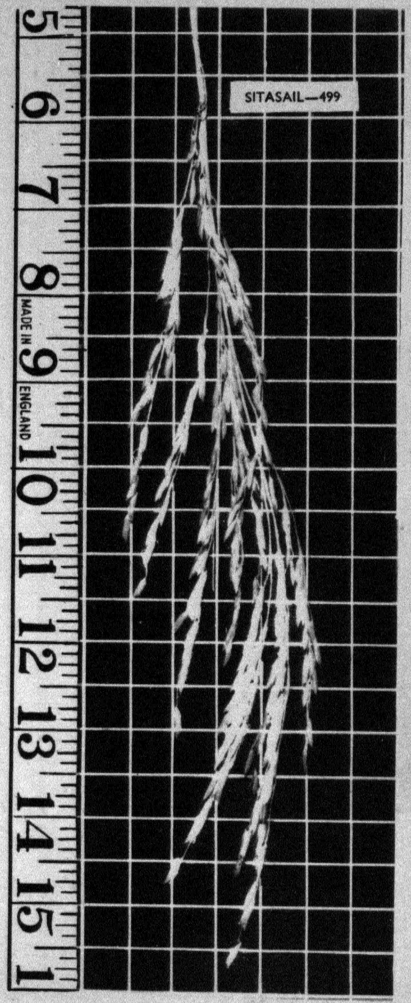


Fig. 4
Showing a panicle of Sitasail 499.
Note the well exserted basal portion and fine grains.

Plate-13

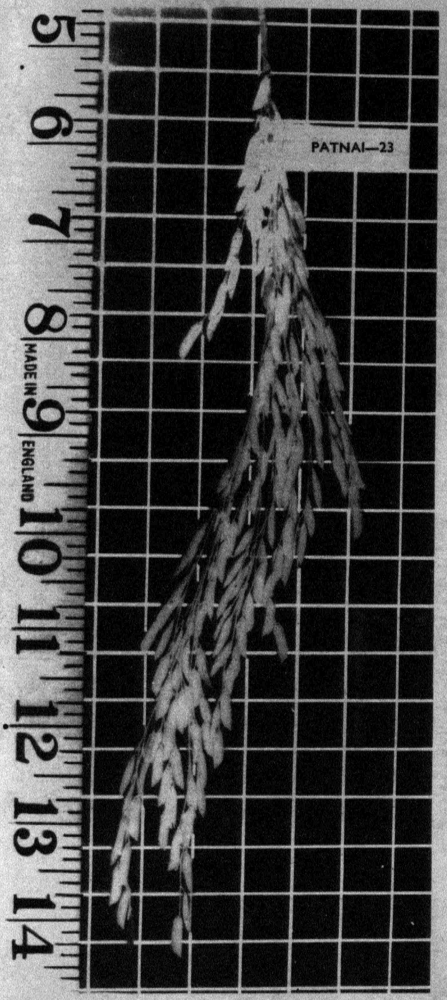


Fig. 1
Showing a panicle of Patnai 23. Note the long, bold closely set grains.

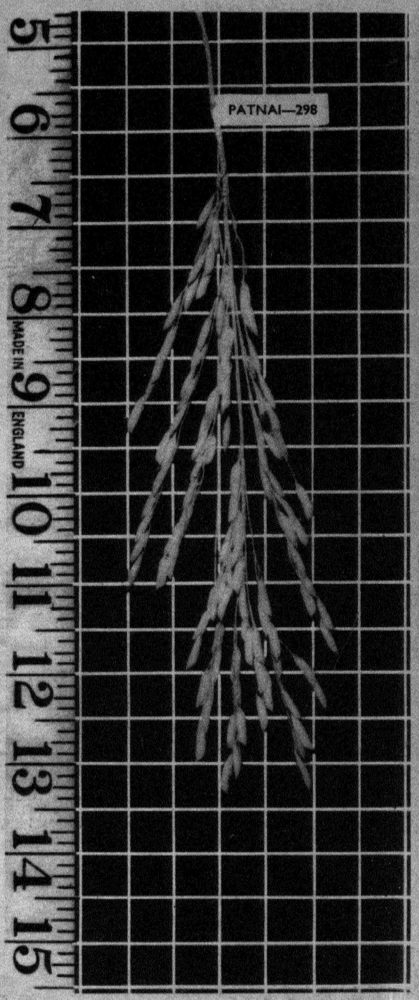


Fig. 2
Showing a panicle of Patnai 298. Note the exsertion.

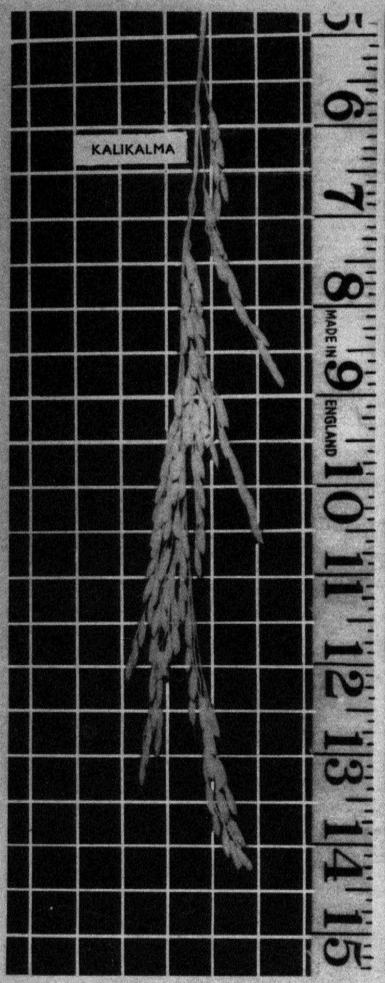


Fig. 3
Showing a panicle of Kalikalma. Note the well exserted basal portion and awned grains.

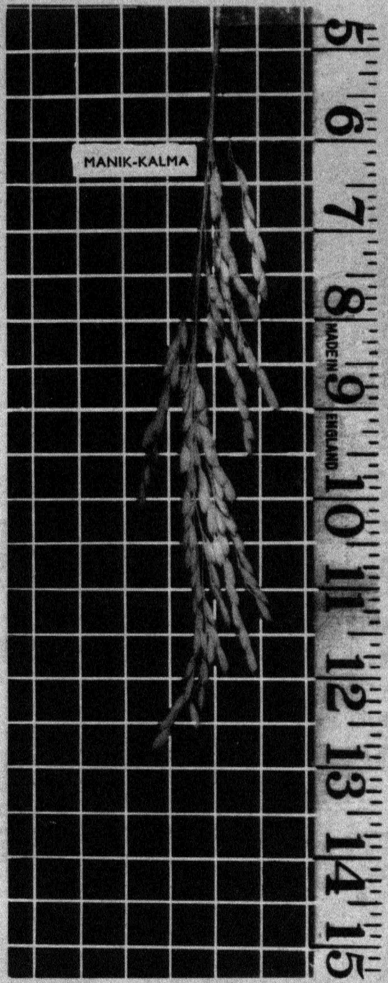


Fig. 4
Showing a panicle of Manik-kalma. Note the slightly tipped grains.

Plate-14

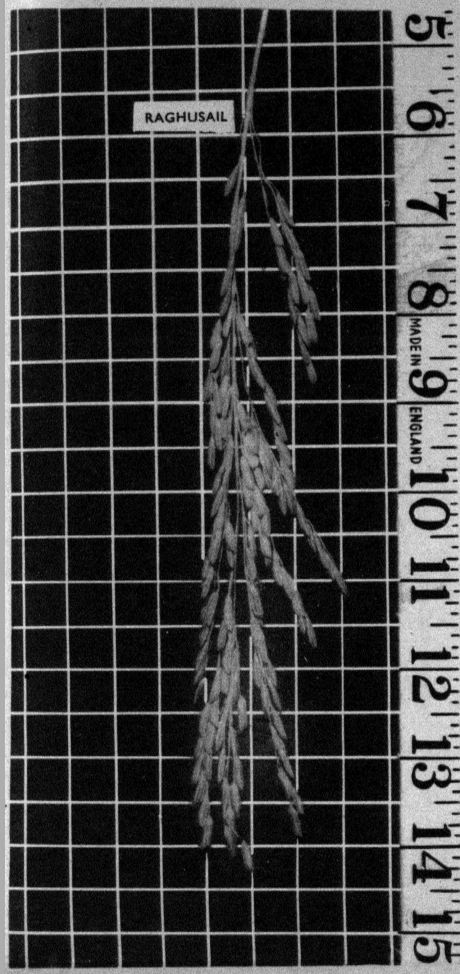


Fig. 1
Showing a panicle of Raghusail. Note the well exserted base of panicle and long grains with slight tips.

Fig. 2
Showing a panicle of Achra 108/1. Note the slightly exserted base and bold grains.

Fig. 3
Showing a panicle of Kumargore. Note the bold well set grains.

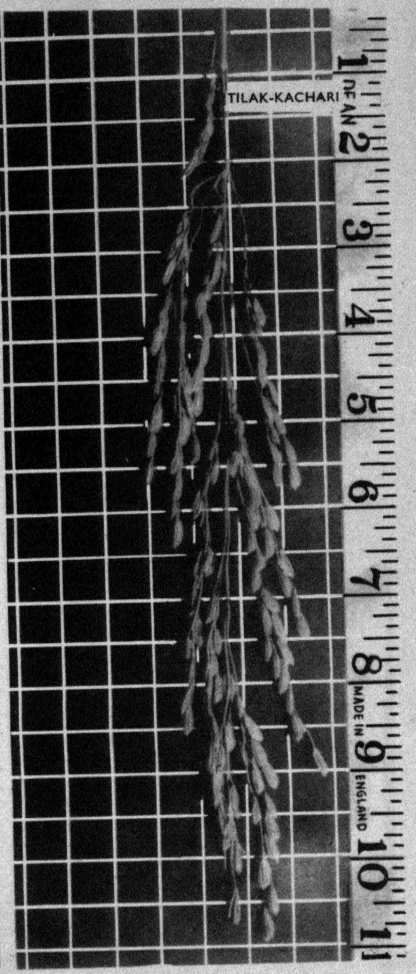


Fig. 4
Showing a panicle of Tilak-kachari.

Plate-15

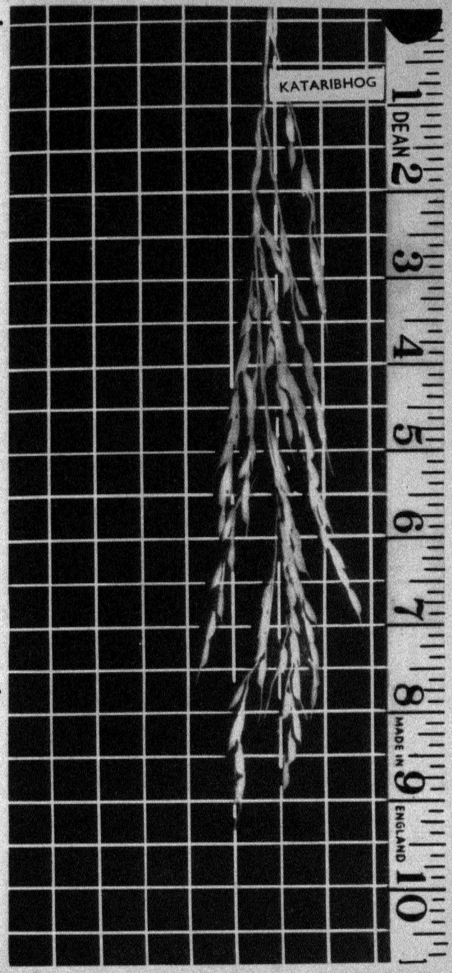


Fig. 1
Showing a panicle of Kataribhog. Note the awned grains and exserted panicle.

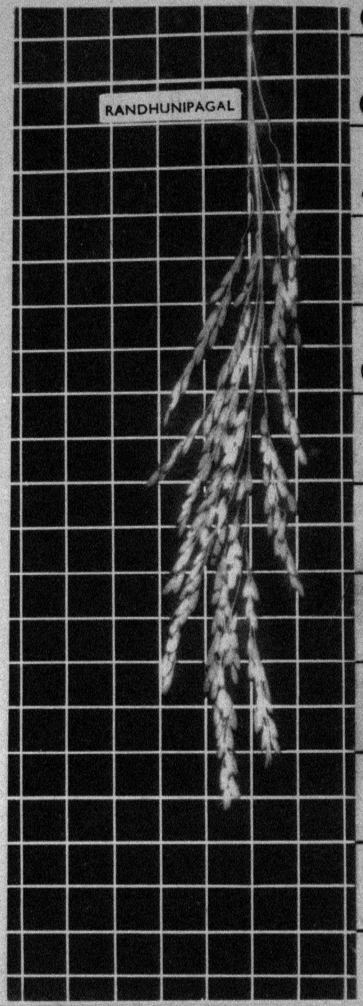


Fig. 2
Showing a panicle of Randhuni pagal. Note the slight tips and well exserted panicle.

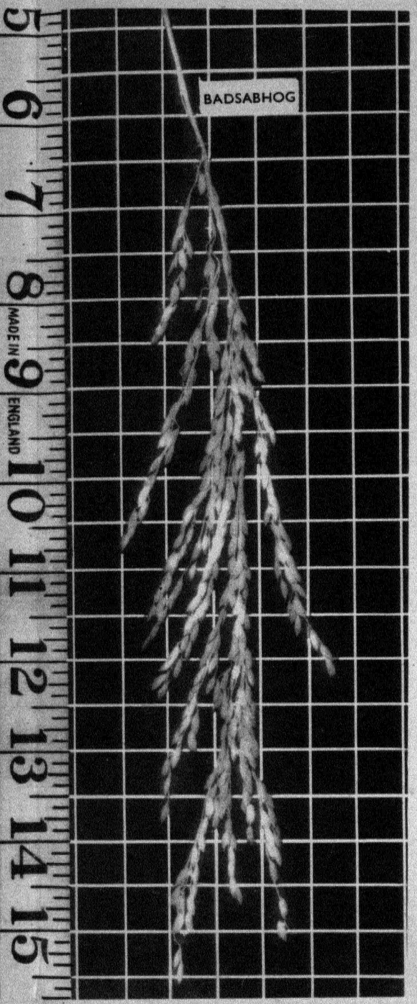


Fig. 3
Showing a panicle of Badsha bhog. Note the awnless grains and well exserted panicle.

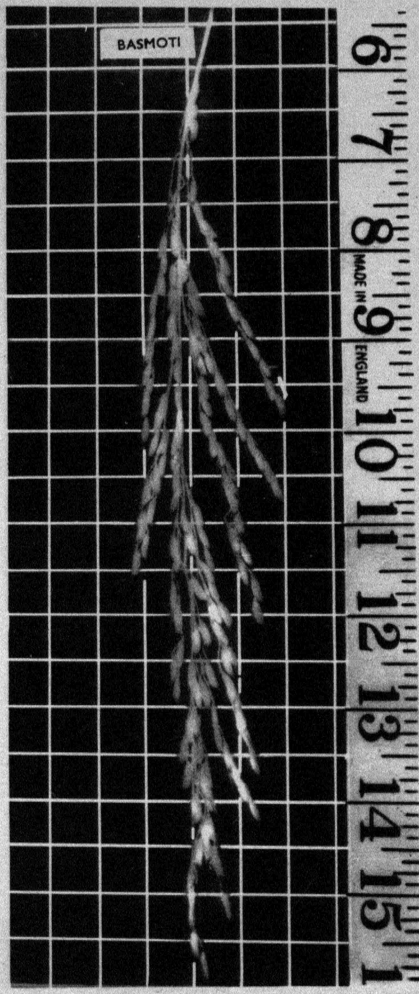


Fig. 4
Showing a panicle of Basmoti. Note the awned grains and well exserted panicle.

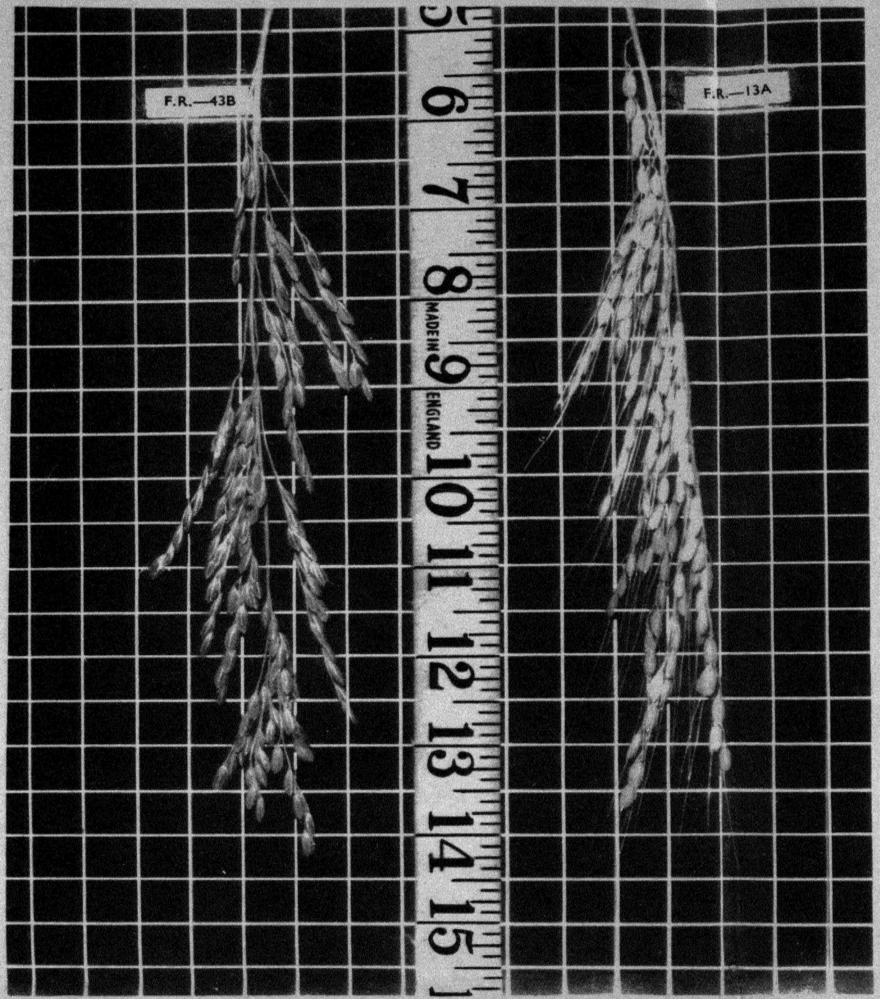


Fig. 1
Showing a panicle of F. R.—43 B. Note the awnless grains and exserted panicle.

Fig. 2
Showing a panicle of F. R.—13 A. Note big awns and non-exserted panicle.

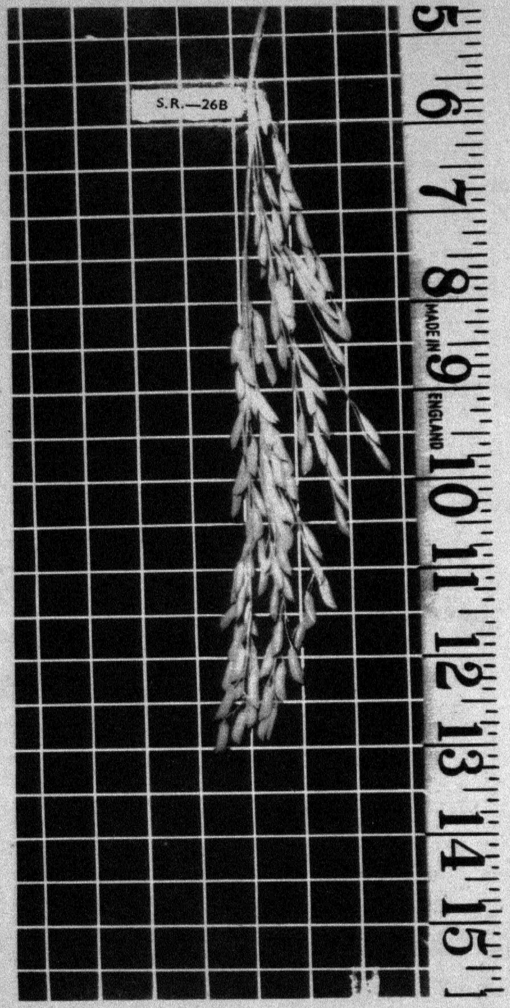


Fig. 3
Showing a panicle of S R.—26 B. Note the awnless grains and slightly exserted panicle.

Fig. 1
Showing a panicle of N. C. 678. Note the tipped to slightly awned grains and exserted panicle.

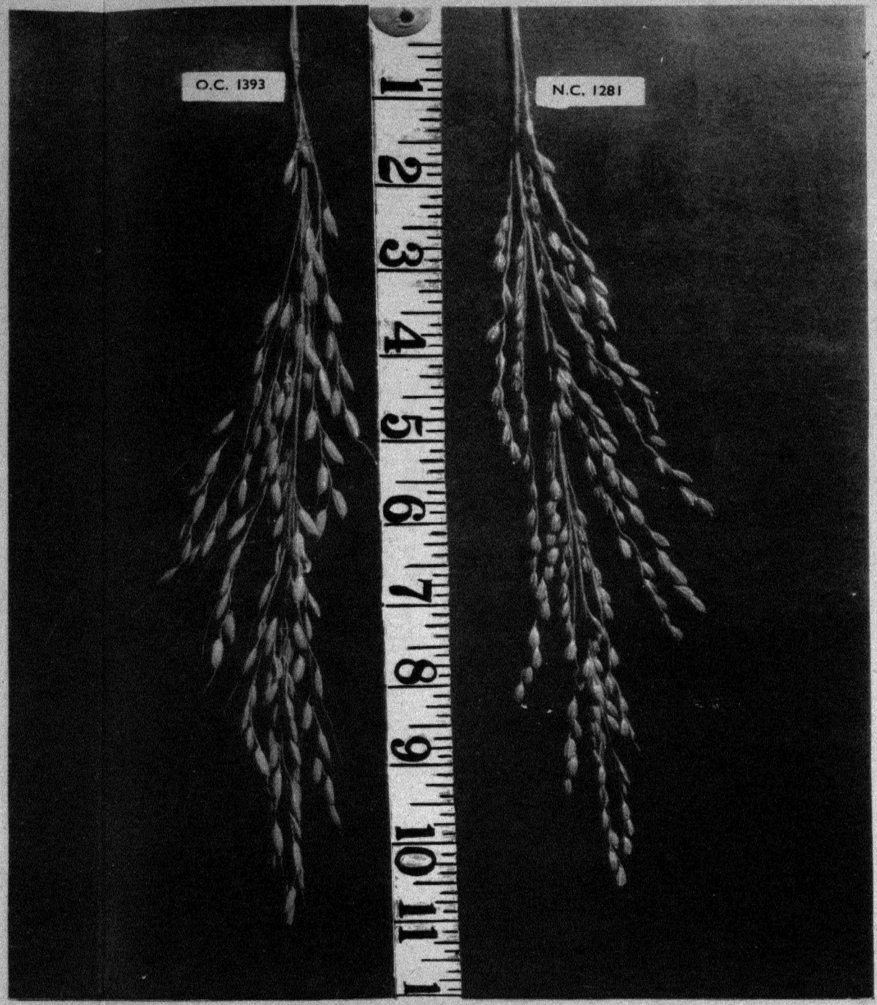


Fig. 2
Showing a panicle of N. C. 1281. Note the awnless grains and slightly exserted panicle.

Fig. 3
Showing a panicle of O. C. 1393. Note the awned grains and slightly exserted panicle.

Plate-18

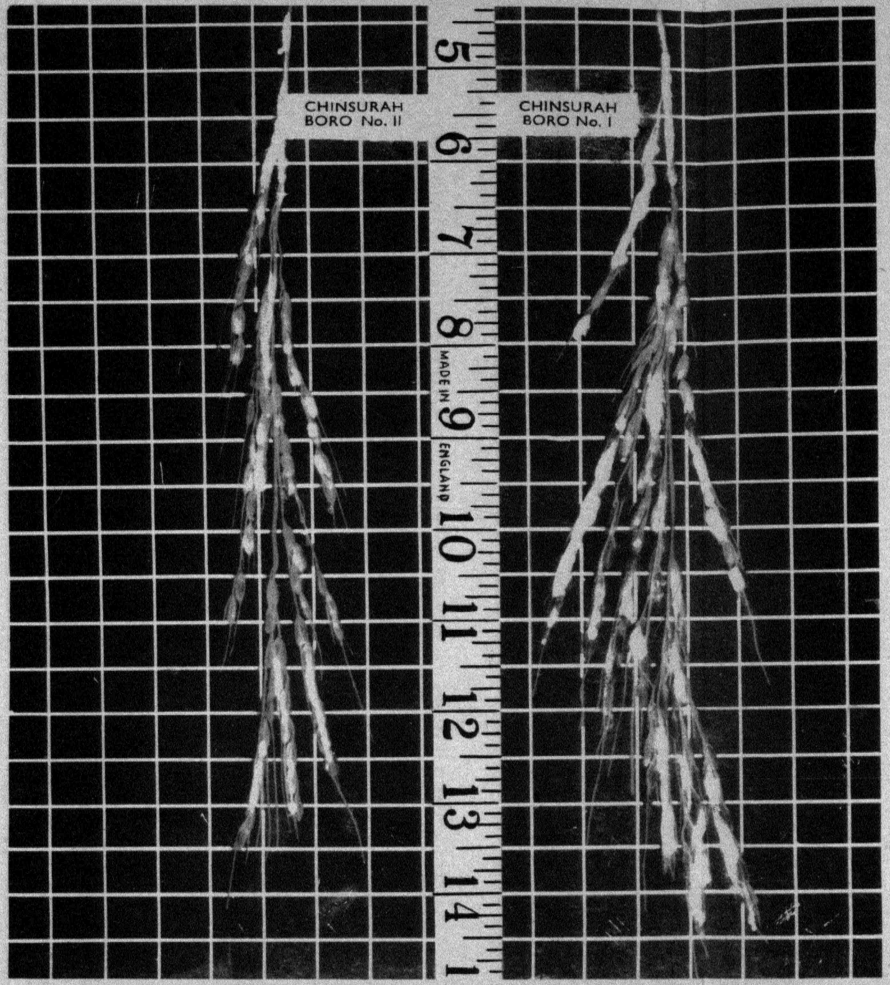


Fig. 1
Showing a panicle of Chinsurah Boro No. II. Note the awned grains and slightly exserted panicle.

Fig. 2
Showing a panicle of Chinsurah. Boro No. I. Note the awned grains and exserted panicle.

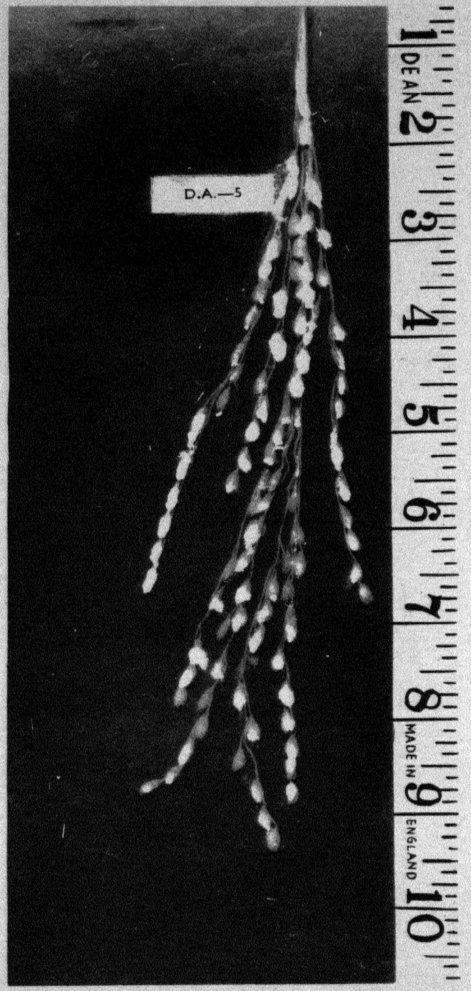


Fig. 3
Showing a panicle of D.A. 5. Note the very slightly tipped grains and slightly exserted panicle.

Plate-19

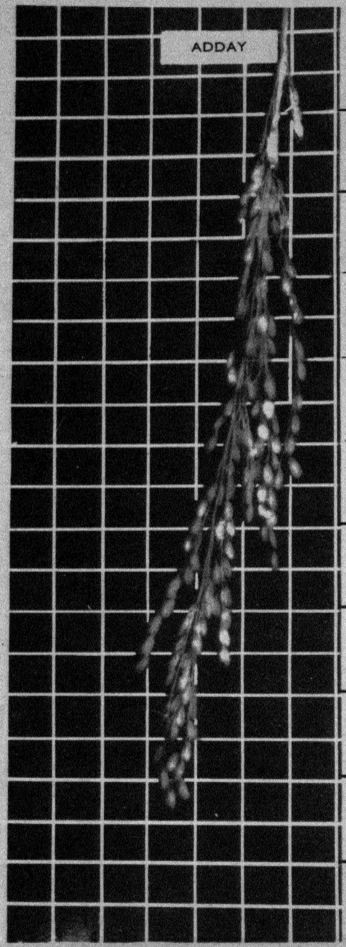


Fig. 1
Showing a panicle of Adday. Note the awnless grains and exserted panicle.

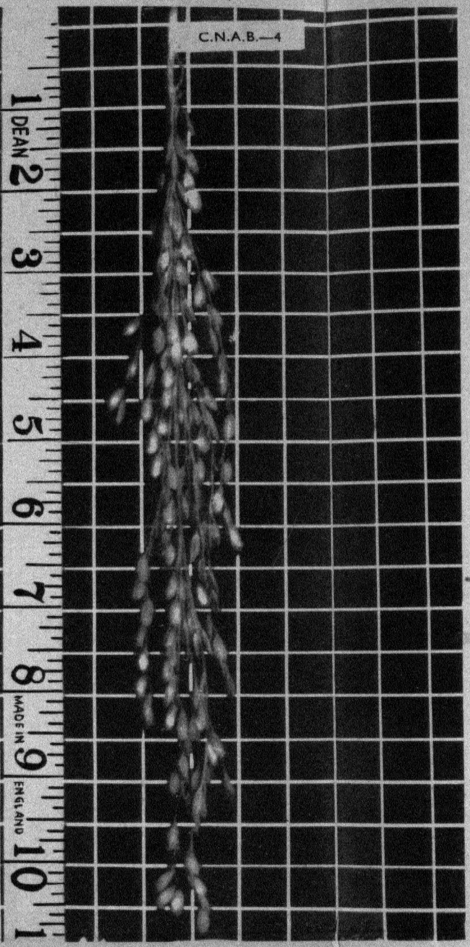


Fig. 2
Showing a panicle of C. N. A. B. 4. Note the slightly tipped grains and slightly exserted panicle.

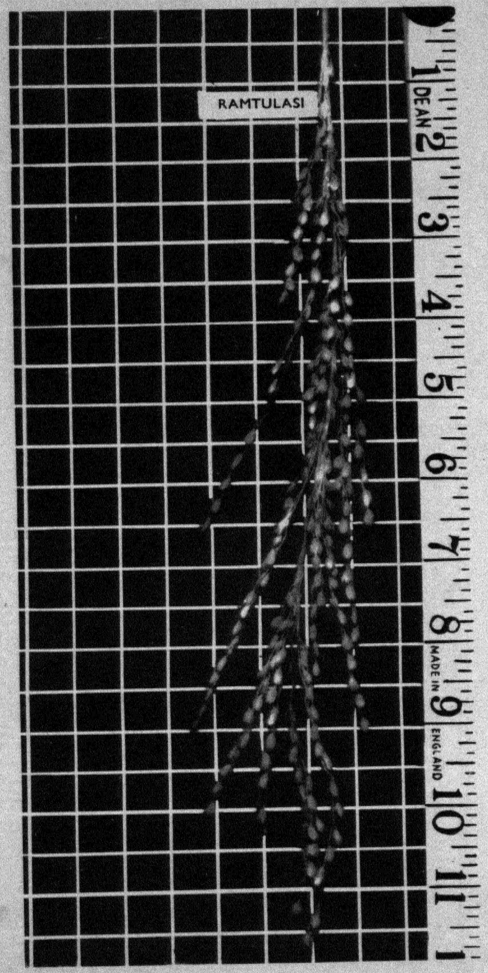


Fig. 3
Showing a panicle of Ramtulasi. Note the awnless grains and exserted panicle.

PLATE - 20

Showing the husked unhusked grains of Aman Paddy.

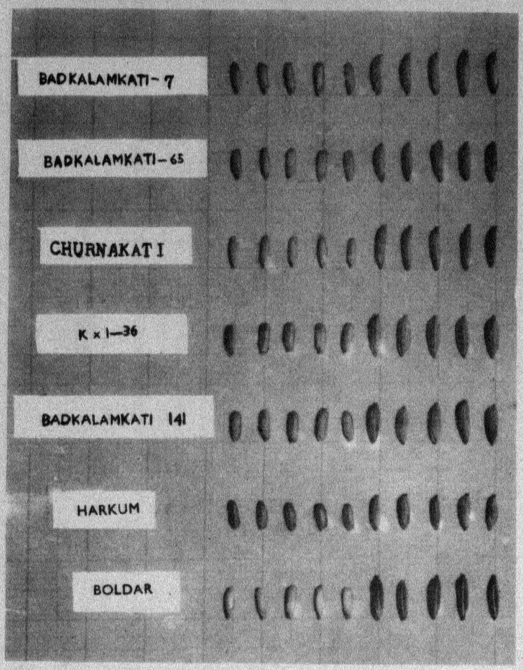


Fig. 1

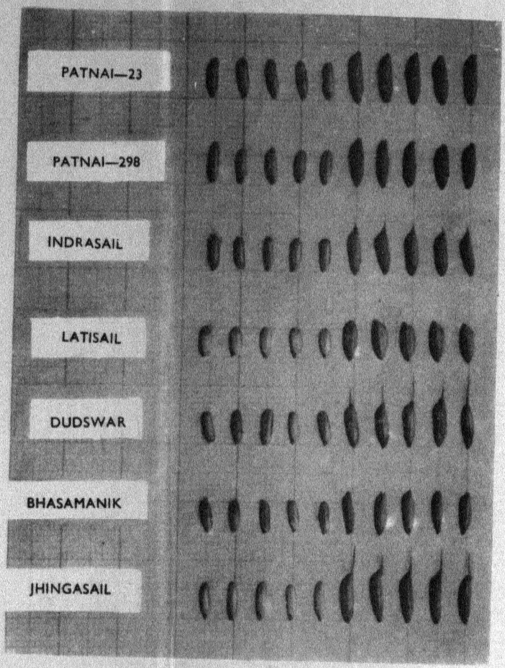


Fig. 2

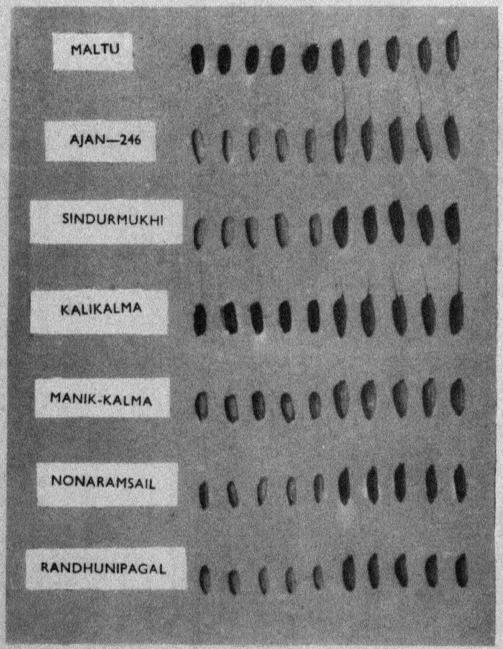


Fig. 3

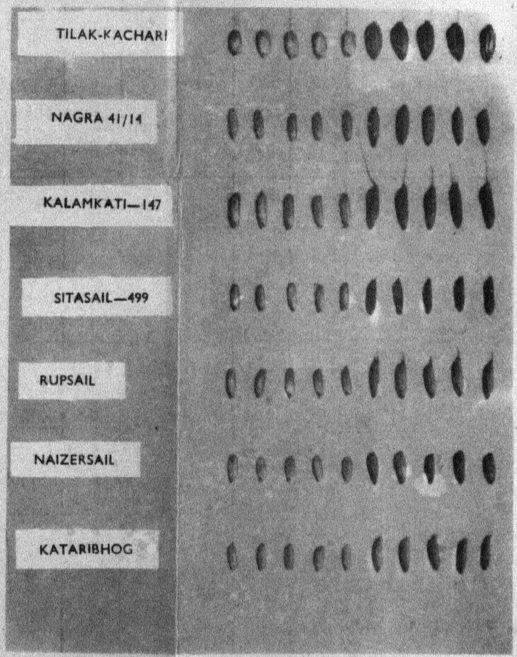


Fig. 4

PLATE-21

Showing the husked and unhusked grains of Aman Paddy.

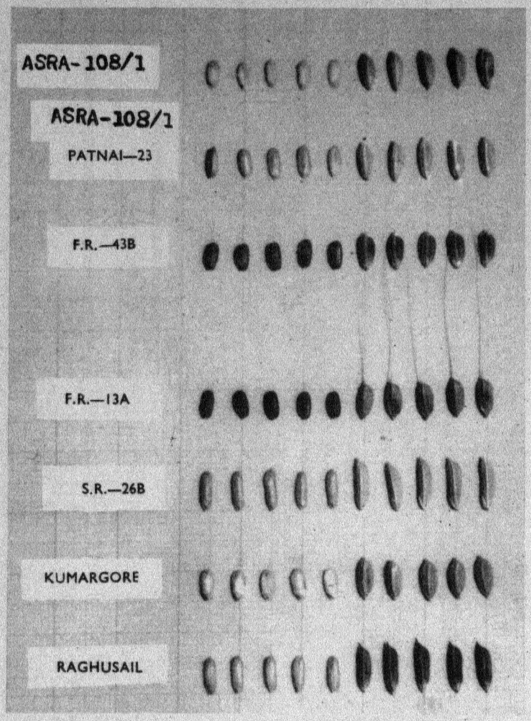


Fig. 1

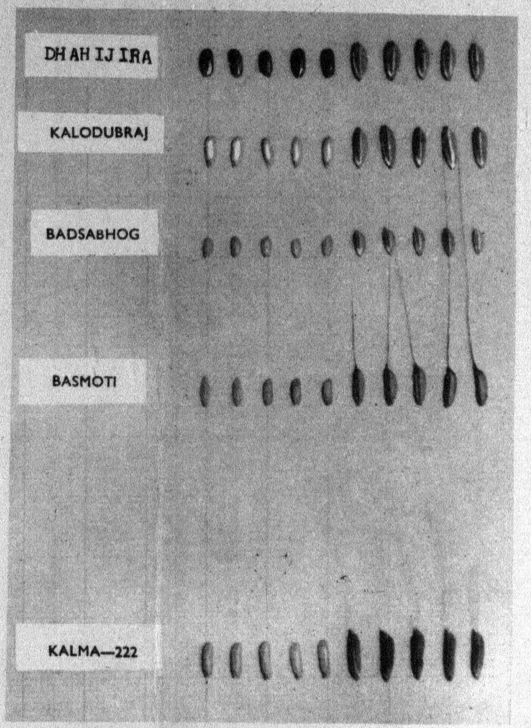


Fig. 2

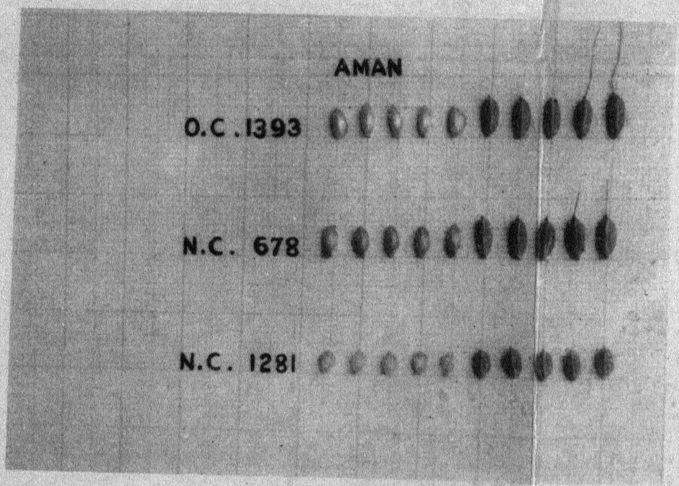


Fig. 3

PLATE-22

HILL AND BORO PADDY

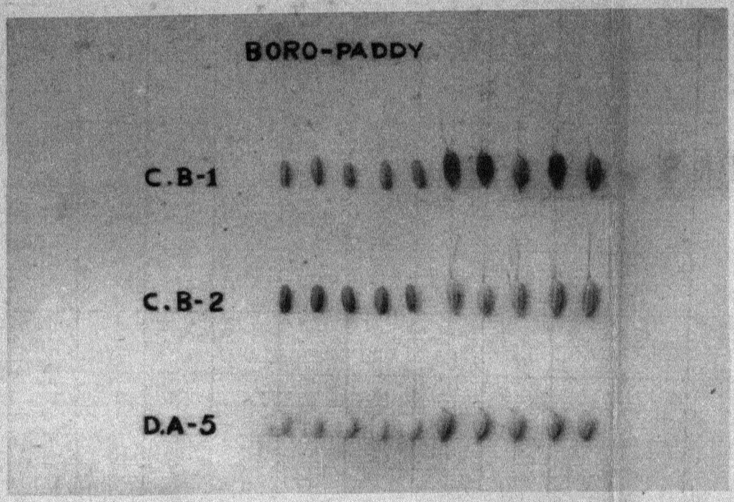


Fig. 1

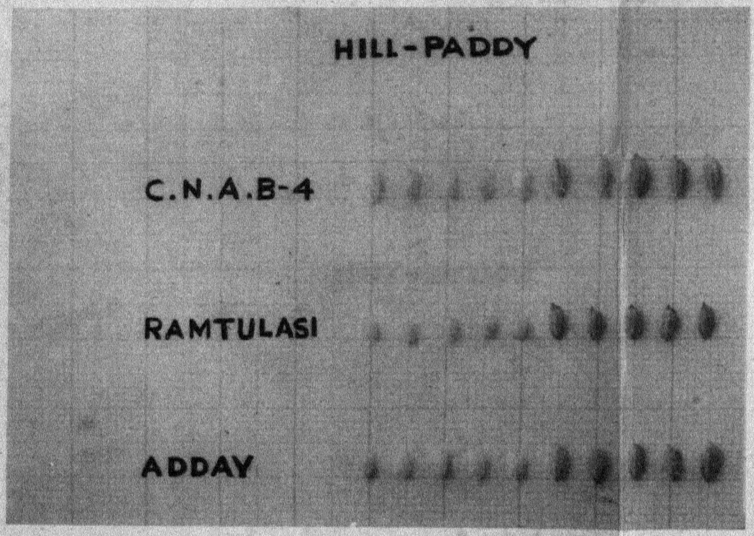


Fig. 2